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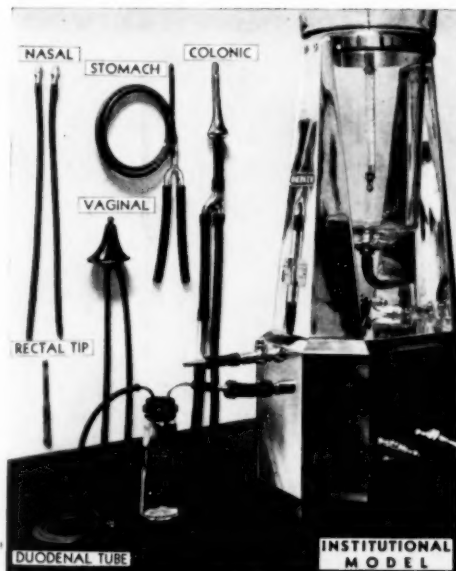
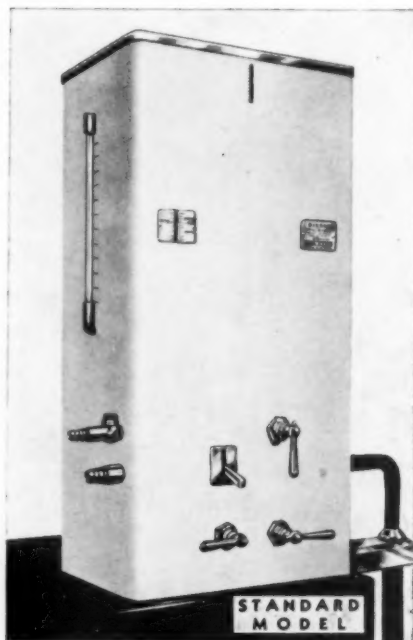
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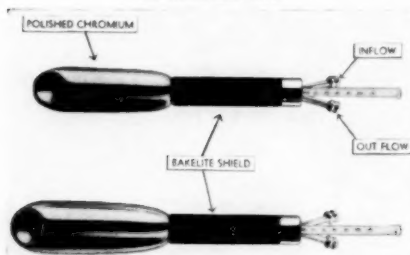
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PSYCHOLOGIC ASPECTS OF PHYSICAL THERAPY *

WILLIAM C. MENNINGER, M.D.

AND

BYRON L. SHIFFLET, M.D.

TOPEKA, KANSAS

The psychologic component in disease is being accorded more recognition in scientific medicine than ever before. Its importance is almost universally recognized by the medical profession and yet there is practically no scientific investigation being carried out to determine its significance as applied to the practice of medicine. In the field of physical therapy there is a conspicuous lack of scientific study and interest in the psychologic factors in disease as well as of their influence in the use of this therapy. It would appear that the men in this field have carefully avoided showing any interest in the psychologic factors. Because there have been many procedures which have been used unscrupulously by quacks, it has been the attitude of some physicians that to admit any dependence upon therapeutic suggestion would be unscientific and lay them open to reproach. The fact that in a medical meeting of this magnitude lasting one week and bringing together the most distinguished leaders in this field, only one paper is devoted to consideration of the patient's psychologic reactions to treatment, may be a reflection of this attitude.

In the past men were not averse to enlisting the power of the emotions in healing the sick. Many patients were relieved by measures which were mainly physical in nature, but psychologic in effect. Perhaps some of the miracles of the Bible and other "miraculous cures" were brought about by such methods in hysterical individuals.

In Europe, in the middle of the eleventh century, kings began the practice of laying their hands upon stricken individuals, and many diseases, among them scrofula, were treated in this manner. "Bath," which still remains one of the great health resorts of England, was founded upon a so-called miracle.

In our own times, many non-medical men, by various manipulations, effect a cure in individuals who have sought the advice and treatment of medical men in vain. In these instances the benefits of treatment and even the cure are accomplished by procedures that are essentially mechanical or physical in application, but psychologic in effect. Uninterested in the deeper mechanism of psychologic reactions, the average medical man does not understand the therapeutic results which shrewd cult leaders often secure, but has a strong feeling of condemnation for them because of their unscientific and often obviously dishonest methods. But this same factor of suggestion operates in surgery and many other medical procedures; why should it not be acknowledged and utilized in scientific physical therapy?

In our investigation of the inter-relations between the physiologic and the psychologic aspects of physical therapy, a careful survey of the immense amount of literature failed to reveal even a single study of the psychologic aspects. One reason for this is that the physician sees definite circumscribed lesions which in many cases respond promptly to x-ray, heat, ionization, ultraviolet, radium, and other agents which are equally efficacious. Yet in no wise does this exclude the fact that other factors have entered into the treatment — factors which the physician is not entirely aware of, but which have undoubtedly worked hand in hand

* The Menninger Sanitarium.

* Read at the Sixteenth Annual Session of the American Congress of Physical Therapy, Cincinnati, Ohio, September 23, 1937.

with his prescribed treatment and which have contributed in some measure to its success.

The physical therapist is not interested in Mrs. Smith's emotional problems when she cries aloud with sharp arthritic pains. He is entirely concerned with specific measures which will ease the pain. If one is fruitless, he tries another, and so on. But there are other things to consider as contributing to the successful management of the case. Among these are the physician's rapport which he has established with his patient and without which he would necessarily be obliged to abandon all efforts at treatment; his ability to listen sympathetically, but always objectively, to his patient's many complaints, and finally his understanding of the patient and the relation of the illness to the patient's personality. Have we not observed that one physician will get extraordinarily good results in handling a case, using the same technic of therapy with which another has failed?

During the past two years, we and our colleagues have become interested in this problem and our interest, which began with our recognition of the importance of the psychologic factor, has grown into an intensive one with observations being carried out on the problem of the relationship between psychologic and physical factors in treatment. About forty per cent of our patients may be described as psychotic and the remaining 60 per cent as psychoneurotic. In all cases we feel that the prescribed physical therapy, whether it be massage, water therapy or heat therapy, in addition to bringing about the desired physiologic effect, should meet certain emotional needs of the patient.

There is nearly uniform agreement among psychiatrists that the most powerful motivating forces in human behavior arise from that part of the personality termed the *unconscious*. These forces or primitive drives are not recognized by the individual but are largely responsible for his reactions. They are etiologically related to the symptoms of the disease, whether these symptoms are expressed physically or mentally. Thus, in evaluating observations of the individual's reaction to physical therapy, one must take into account not merely his conscious attitude and reaction, but also these powerful influences and strivings from his unconscious.

This theory of the unconscious necessarily changes our point of view as to the treatment of disease. If a man is unconsciously seeking certain satisfactions and is unable to find them in his everyday environment he may fall ill. The illness brings him attention and other rewards which he could not obtain otherwise and he therefore accepts the disease as a substitute for the satisfactions he was unable to secure in health. If the physician then treats the disease without reference to the psychologic needs of his patient he may meet passive indifference or even active opposition on the part of the patient. The physician is reluctantly compelled to realize that the foe is not always an invader but may be something within the patient. He is reminded of the comparative ease with which some people fall ill, the repetitiousness of their afflictions and the persistence with which they cling to their illnesses.

If, on the other hand, the physician recognizes and ministers to the psychologic needs of the patient, the patient himself will often find the cure. This is more easily seen in such cases as conversion hysteria where the psychologic elements predominate. If such a patient responds to physical measures we may assume that the results obtained are due to psychologic rather than physical effects. Many mentally ill patients who have no physical complaints whatever show a marked improvement in their mental condition after receiving physiotherapy. Marius the Epicurean said, "All the maladies of the soul might be reached through the subtle gateways of the body." This relationship is readily admitted by some physicians who fail to see that the same psychologic mechanisms that motivate mental illness are operating in organic disease, but in different degrees of intensity. If this is true, we can expect not only to find psy-

chologic elements in organic disease, but in some instances a psychologic purpose motivating the illness. In all cases for which physical therapy is prescribed, therefore, it would be advantageous to determine the patient's psychologic needs.

Personal Observations

Our prescriptions for hospitalized psychiatric patients at the Menninger Sanitarium are based primarily on an interpretation of the individual's unconscious strivings. We, of course, give due consideration to any physiologic or physical needs of the patient which may be benefited by physical therapy, i. e., stimulative or sedative effects, eliminative or tonic effects.

You will naturally inquire what method is used in determining psychologic needs which are unconscious. We do not yet feel that we are in a position to adequately evaluate all the psychologic needs that a patient may evince, nor do we assume that physical therapy can serve them all. But we have found that this type of treatment can be especially adapted to meet at least three of these and is effective in proportion to the extent that these unconscious strivings are satisfied. For example, a very common unconscious need which patients exhibit is desire for love. The patient is, of course, unaware that he wishes to be loved, but he shows it very plainly in his incessant complaints, his rehearsal of his symptoms and his unreasonable demands for attention. Some individuals evince this need by stomach trouble, backaches, menstrual disorders, headaches, and a host of other physical complaints which represent their irrational, i. e., unconscious method of obtaining love and attention. In addition, there are many instances of acute mental illness in which the patient's symptoms also represent a disturbance in his love life and indicate that his conflict is centered around a need for love. In this group also physical therapy may be successful because it represents a method by which the patient may receive some attention (love), administered in a manner as to leave no doubt as to the personal nature of the treatment. The personal attention given by the therapist, and often the actual physical contact (as in massage) is of extreme importance in the effective therapy.

To cite some illustrative examples:

A dignified and cultured housewife of 48, came to us with a mild depression and considerable anxiety, feeling that members of her family had ceased to love her. She half-heartedly followed a planned schedule of activity in occupation, education, and recreation which was specially designed to afford her security in love and affection. But from none of this activity did she derive the apparent benefit that she obtained from physical therapy where she received warm packs. As she grew better she appeared to identify herself with the physical therapist to whom she had become very much attached. Her marked improvement and recovery must be largely ascribed to physical therapy, perhaps more accurately to the therapist. The patient herself believed her recovery to be due to this influence. She has remained well during the eight years following her stay in the sanitarium, and interestingly enough has maintained a faithful correspondence, entirely non-professional in type, with the attendant.

A second patient with vague aches and pains in every part of her body was quite dissatisfied with most of her treatment and became openly aggressive toward physicians, nurses, and attendants. Psychotherapy in various forms in the hospital was attempted with no results, because she was quite inaccessible and hostile. Later it was noticed that her attitude began to change for the better following a series of special light treatments in the physical therapy department. During each treatment the patient insisted that the therapist sit beside her and hold her hand to see that no harm came to her. This was done. After several weeks of treatment she remarked one day, "The light is the only thing that has benefited me since I have been here." In view of the fact that her symptoms were entirely functional in origin, one can assume that the improvement was due to the gratification of the need for love which, because of her antagonism to psychiatric treatment, she was unwilling to accept from anyone except the physical therapist from whom it came in the guise of light rays.

A second need which physical therapy may meet is an unconscious one for increasing self-esteem. Some patients are introspective. They feel insecure or uncertain, and they represent perhaps a majority of the persons who take up the physical culture fads. This need for "building one's self up," the excessive interest in one's physique, conceals great feelings of inferiority and inadequacy. It is often associated with an unconscious conflict about sexuality. Physical therapy thus represents a form of reassurance, a concrete mechanical and physical method of combating the patient's unconscious fears. Rarely does the physical condition demand physical procedures, yet such patients often feel that they have benefited greatly from a course of massage, various types of sprays and salt glows, which give them a sense of well being that persists long after the physiologic effects subside.

A hospitalized male patient of 38 years, addicted to alcohol, wanted to be "built up" physically, in spite of the fact that the examination revealed that his physical condition was good. Despite his expressed desire, he remained unresponsive to invitations to physical activities, to recreation and sports, and regarded with disdain any program of socialization in groups with other patients. In fact, he refused nearly all of the program planned for him except physical therapy but to this department his faithfulness was conspicuous. He received alcohol rubs, ultraviolet radiation, vibratory massage, needle spray and cabinet baths. One may inquire what satisfaction this patient found in physical therapy that he could not obtain elsewhere.

The history of this patient revealed that he had a powerful, aggressive father and a protective over-indulgent mother. Feelings of inadequacy which this man felt in comparing himself with his domineering father led him to avoid masculine competition and to seek satisfaction in more passive ways such as extreme dependence on his family and drinking to excess. Therefore, in the hospital he avoided active sports which would bring him into competition with other men, and sought out a form of treatment in which he could remain dependent and obtain from a woman technician the attention and indulgence which his mother had lavished upon him in his childhood.

In this case although the alcohol addiction brought him to treatment it was not the main problem. Behind it lay the personality defect which was expressed in his inability to compete with others and his extreme dependence. His indulgence in alcohol was an attempt to bolster up his self-esteem and allay his feelings of inferiority. In a certain sense, therefore, physical therapy afforded him a substitute for his drinking. At the same time, however, it served to introduce him to a more active program of special treatments which he gradually accepted. Without the initial indulgence given him in the physical therapy department it would have been almost impossible to secure this patient's co-operation in the activities which were at first distasteful to him.

We could cite many illustrations of this. In some patients the psychologic benefit is entirely responsible for the results; in others the relief of their undue concern about their minor physical difficulties is more important than the actual physical benefit in bringing about their improvement.

A third unconscious psychologic need which is met by physiotherapy is the desire for punishment. To some this may sound strange, but every physician is familiar with many patients who prefer unpleasant treatments, bitter medicine, operations, and who demand painful remedies. In psychiatry we attribute such behavior to an unconscious need for punishment, punishment that is always associated with an unconscious feeling of guilt. The punishment is an attempt to neutralize this sense of guilt, but the patient may be consciously unaware of either this guilt or the need for punishment. Many illnesses, both mental and physical, are undoubtedly related to the patient's sense of guilt and this operates to produce and often to prolong illness. If the guilt can be assuaged by vigorous treatment, which the patient can interpret as punishment he is able to relinquish some if not all of the symptoms which characterize his illness.

In our experience continuous packs and neutral baths have been most effective as a means of supplying what the patient regards as punishment. It

happens that in our department we have no procedures that are particularly painful. One might assume that if such were available they might be even more effective. We have occasionally had patients who insisted on very heavy percussion including such procedures as hacking, spitting, and beating. In one particular instance the patient made the remark, "Play like I am all your enemies and beat me up." In fact, he did not like a rub unless the attendant was almost rough.

Another patient, a middle-aged man who exhibited clinically a good deal of anxiety, would frequently attack his nurse verbally and sometimes even physically and then feel very repentant and apologetic. In such periods, he seemed grateful to receive prolonged neutral immersion baths which served to restrain him from his aggressive behavior.

A patient with various physical complaints and self-accusatory trends, once tried to impress us with the hopelessness of his case and constantly expressed a wish to die. He made it evident that he regarded his illness as a form of punishment for misdemeanors of which he accused himself. The electric cabinet bath was prescribed by the physician with the aim of gratifying the patient's punitive wishes. The patient accepted many of these cheerfully, once remarking jokingly that "the cure was worse than the disease." The treatment apparently served as a substitute for his symptoms which gradually disappeared. In this case, physical therapy was only one of many treatments prescribed; but in the opinion of the physician, the effect of this treatment, although it could not be quantitatively evaluated, was the most beneficial in his entire therapeutic program.

Many psychiatric patients in the sanitarium, following a prescribed schedule of activities, often tell us that physical therapy treatments helped them more than anything else. To the understanding physician, this means that it afforded them some psychologic satisfaction apart from its objective physiologic value. It is believed by some physicians and quite frankly stated by a few that the psychic element in physical therapy is the basis for the success of many health resorts and spas. It is no reflection on modern science in this field to recognize that patients, at least unconsciously, regard the *heat, light, and water* used in physical therapy as possessing magic properties. The competent physician capitalizes this fact instead of ignoring it.

Summary

We have attempted to show that psychologic factors not only play an important role in the practice of physical therapy, but that these factors, in some instances, can be determined and utilized scientifically in the prescription of definite procedures and in the direction of treatment.

We hope that this paper will arouse additional interest and stimulate further scientific observations into this aspect of physical therapy.

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Discussion

Dr. Ralph Hanks (Fulton, Mo.): That psychology has a pretty definite bearing upon the treatment of a great percentage of patients the physician is called to treat, I believe, is pretty generally accepted. The method of producing this psychologic effect depends largely on the physician or operator. Physical therapy lends itself well to this phase of treatment, however, I wish to stress a few points on the psychology of treatment without regard to any particular type of therapy. Even if the physician is so fortunate, or unfortunate, as never to be required to see a case of outspoken mental disease, he should never forget that the sick individual has a mind as well as a body, and that the course and outcome of the organic morbid process is tremendously influenced by the mental attitude of the patient. Psychology teaches us that this attitude can be controlled by the physician and directed into helpful channels; that man is something more than the sum of his parts and organs; and that the physician must not only treat this or that symptom, but he must treat also the patient as a psychologic entity.

The mental vicissitudes of any illness usually outnumber the purely physical. Often the patient is apprehensive and uncertain. He may be irritable and unreasonable. Many times he is depressed and may readily sink into the depths of despair. These unhealthy emotional reactions frequently are reflected in the falling barometer of his general condition. The physician who is also a psychologist will know when to be gay or grave, casual or explicit, firm or lenient, when to praise or chide.

The conservation and utilization of brain power to be found in those who are suffering from such conditions as chronic cardiovascular and renal degenerations, tabes, the sequels of cerebral hemorrhage, or what not, has, in many instances, conferred enormous benefits upon humanity.

Whatever plan of treatment is adopted, hurry, carelessness, impatience, unwillingness to make notes, not only deprive the physician of needed knowledge, but also prevent the establishment of proper relations with the patient, without which, nothing constructive can be accomplished. It is important to get a complete history, then a careful physical examination should be made. This may reveal some somatic pathology. The examination itself, if complete and carefully performed, has a beneficial effect upon the patient. It also puts the physician in an advantageous and authoritative position for the future management of the case. He has

now obtained sufficient information to enable him to estimate the situation and formulate the treatment. In the treatment, rash promises should be avoided, but lack of confidence is fatal. If there is social or environmental friction it is necessary that he be given a correct point of view toward it.

If the patient is willing to put himself unreservedly into the physician's hands to do as he asks, then the ground is clear for effective action.

Dr. Alfred B. Olsen (Battle Creek, Mich.): There is practically no literature on this subject as the essayists have told us. However, there are many aspects from which to look at this interesting subject. One that attracts my attention is the strong personal appeal of physical therapy because it is based on a natural system of health building, which offers a generous variety of simple healing procedures.

Whatever the complaint may be, most patients seeking medical help are nervous, apprehensive, and worried. In addition to physical relief they want encouragement and reassurance. Most sick people like to be waited on and receive attention, and this is what they need. It gives them a feeling of assurance and comfort to have things done for them which ameliorate their suffering. Contact with tactful, courteous and efficient nurses and attendants while receiving treatment at their hands, gives relief and increases faith. This tangible human touch, this personal application of the remedy to the aching body and the soothing effect of the bath or massage quickly wins confidence. They feel that without delay, something is being done to abate their sufferings. But the physician does more for his patient, for his armamentarium includes, in addition to remedial applications to the outside of the body, wise counsel about diet, elimination, rest, sleep, exercise, and the daily habits.

A splendid advantage for the chronic invalid is a visit to an established clinic of national reputation, not the ordinary hospital but a well-equipped hotel of health which partakes of the elegance, ease, and comforts of a first-class hotel. Here the ailing guest finds himself in a genial atmosphere of hope, inspiration, and good cheer. Within a day or two he is following a pleasant program of tonic baths, exhilarating heliotherapy, soothing massage, and various other health-building measures and attractive diversions. Restful relaxation supplants exhausting and painful nervous tension, and the mind is diverted from anxious introspection by the treatment and atten-

tion of the nurse. Her cheerful smile and optimistic attitude are contagious and courage takes the place of apprehension and fear. Very soon he catches the inspiration of a new life and finds he is regaining health. The attractive change of environment, the freedom from the daily grind of work and duties, separation from the big and little annoyances and irritations which so easily wound his hypersensitive nerves, all bring ease. He seems to have entered a new and alluring atmosphere impregnated with hope, courage, and healing power. Soon he imbibes the contagious spirit of improvement and renewed life with restored health and he realizes he is speeding on the road to recovery.

With each procedure or physical ap-

plication goes a certain amount of suggestion and encouragement. The patient feels that he must be receiving benefit and soon he is aware of an uplift and betterment. He is on a health-building regimen and everything done to and for him strengthens morale and promotes recovery. It is true that some measures, such as electrical modalities, often convey more inspiration and suggestion than others, possibly because of a certain amount of mystery. All that is done to an individual for the cure of disease should carry an uplift and strengthen faith as well as forward a return of health. There is no system of remedial treatment which accomplishes this vital objective more successfully than physical therapy.

EVALUATION OF TREATMENT OF PERIPHERAL VASCULAR DISEASE BY ALTERNATING POSITIVE AND NEGATIVE PRESSURE *

ROBERT P. STURR, M.D.

PHILADELPHIA,

Sufficient time has elapsed since the original work of Landis and Gibben¹ and Herrmann and Reid² to more completely evaluate the treatment of peripheral vascular disease by means of alternating positive and negative pressure. I not only wish to present a complete report of fifty cases studied in our department, but I also have made a thorough review of the literature on this subject.

In obtaining statistical data concerning a new form of treatment, there is always a weakness of nature portrayed in that the statistician becomes over enthusiastic and frequently and most innocently gives conclusions that are not unbiased. Our cases have been thoroughly checked as to the type of disease causing the vascular occlusion. Many have had roentgenographic study in order that the extent of calcification of the peripheral vessels could be visualized; others have had skin temperature studies, oscillometric readings, electrocardiograms, blood sugar and Wassermann tests. After a complete physical examination, including some or all of the above laboratory studies, it is unquestionably true that a great number of these patients suffering with peripheral vascular diseases are not proper subjects for treatment by means of suction and pressure. Not only will a certain number not respond, but some will be made decidedly worse and much valuable time might be lost in giving a type of treatment that is not indicated. Patients showing roentgenographic evidence of extreme calcification of the major and secondary or minor arteries with lessened or imperceptible oscillometric pulsations were not relieved.

* From the Department of Physical Therapy in the Department of Neurology, Jefferson Medical College.

Read before the Pennsylvania Physical Therapy Association, Philadelphia, January 21, 1937.

Indications and Technic

In our series we have had no serious complications in treating our vascular cases. However, I feel that true complications might have arisen had not each case been studied and minute observations made of the circulatory reactions during the first few treatments. The first change made in treating peripheral vascular diseases was a reduction in the amount of pressure and suction. The first workers used 120 mm. mercury negative pressure and 80 mm. mercury positive pressure. We found that much better results were obtained with less discomfort to the patient if this was reduced to 80 mm. mercury, negative and 20 mm. mercury positive pressure. With higher pressure, profuse bleeding was noted from the margins of leg ulcerations. Not a few of the patients complained bitterly of tingling and fullness and some refused to return for further treatment. We have never attempted to treat a case where we feel there is confind pus of a septic thrombus. Recently, a patient was referred for suction-pressure in which the entire right leg showed evidence of cellulitis. The skin of the extremity was hot and red, there was inguinal adenopathy with some elevation of temperature. There is no question that we might have done much harm had we instituted treatment and had the patient later developed a septicemia or bacteriemia, the blame would have been placed at our door.

Knowing the contraindications of this type of treatment, we are most interested in knowing just what type of peripheral vascular diseases has been most helped by this method. In reviewing the literature, I note that there is a marked diversity of opinion.

We have treated 5 cases of Buerger's disease, 3 of which have shown excellent results and have no present symptoms except after extreme exercise. One was improved and one unimproved and treatment discontinued.

De Takats³ reports that most cases of Buerger's disease are not influenced by this means of treatment. He also states that the patient suffering from a low grade progressive inflammation of the arteries and veins, with a number of short plugs, does not respond well.

Striking results were obtained in the treatment of leg ulcers and trophic ulcers of the feet. Many of these patients had been treated for a number of years and in some instances the ulceration had nearly encircled the leg. There is no question that in all of these recalcitrant, sloughing ulcerations of the lower extremities that will not granulate and slowly spread, there is a vascular background. Fifteen of the most chronic types were selected for treatment. Of this number, 65 per cent were completely cured and had an average number of 47 treatments of one hour. The first sign of improvement was a general change in the appearance of the ulcers from a low grade sloughing to bright red granulations which bleed easily if too much suction is applied. Extreme pressure and suction will produce severe hemorrhage.

A very constant finding in treating all types of peripheral vascular diseases is that the hospitalized patients did much better than the ambulatory cases, showing conclusively the value of rest and elevation.

The first sign of improvement after treating occlusive vascular disease by suction and pressure is relief of pain. Allen and Brown⁴ state there are three common types of pain observed in chronic occlusive arterial disease: (1) that in the region of ulceration or gangrene, (2) that associated with ischemic neuritis, (3) that following sudden arterial occlusion which appears to be due to widespread arterial spasm.

They also report 60 cases treated by suction and pressure at the Mayo Clinic with 32 treated over a sufficient time, using 60 mm. of negative and 20 mm. of positive pressure, 4 cycles per minute, with all patients confined

to the hospital. They conclude that this is a help rather than a cure in the treatment of vascular diseases and do not feel that at present evaluation can be made.

The cases showing edematous swelling and ulceration also improved more rapidly with the use of a supportive elastic bandage applied when arising; the ulcers cleansed daily and a solution of gentian violet applied.

Arteriosclerosis

Conway⁵ treated 7 cases of arteriosclerotic ulcers, 4 of which responded well to treatment. He also reports that of 36 patients treated from three to six months with treatments 1-1½ hours, four times weekly, 78.5 per cent were relieved of major symptoms and classified as improved.

I have never seen a leg ulcer of any size heal in the presence of edema or the slightest pitting of the tissue. With the institution of vascular exercise, rest, surgical care and supportive dressing, it is pleasing to note the rapidity of healing.

By far the largest group of cases referred for peripheral vascular exercises are those included in the group of arteriosclerosis obliterans. In this group, the greatest caution must be exercised in selecting cases for treatment. Excluding the syphilitics, the greatest number comprise the aged and those suffering from diabetes. A number already have gangrene of one or two of the toes or half of the foot when they are referred for treatment. In some instances they are in the stage of mummification and nature's line of demarcation has already been established. Roentgenographic studies are of great value in this group in determining the amount of calcification in the large vessels and their smaller ramifications.

It is of unusual interest to note the constancy of the physical and roentgenographic findings when studying vascular disease of the sclerotic type. In 1926 I assisted in some research in injecting the peripheral arteries with lipiodol in order to visualize the site of occlusion and to demonstrate collateral circulation. Much valuable information was obtained, but the exposure of the vessels and their injection became a major surgical procedure, especially as the patient with vascular impairment is not a good surgical risk. We did not feel it was a practical routine procedure especially after one instance in which arterial injection caused a gangrene of the entire leg in a case of Buerger's disease which demanded subsequent amputation.

Our aim in giving suction and pressure is to establish a collateral circulation in the smaller and minute vessels. If these are also involved, little benefit can be expected. Also, if these patients are unable to remain in the hospital and have to be carried or undergo unusual exercise in coming to the clinic, possibly more harmful results come from this unusual exercise than any good that could be obtained by infrequent treatments. As in many other diseases, our best results are obtained in the early cases where there is only moderate intimal proliferation, when collateral circulation can be established before the major vessels are occluded, and when the patient is first complaining of tingling in his legs, pain on walking and cramp-like pains at night, which are so frequently misdiagnosed as neuritis and rheumatism.

Salstien, Meyers and Rosenweig⁶ treated cases diagnosed as arteriosclerosis obliterans, five of which were subjectively improved but there were no permanent changes in the objective manifestations. They also treated eight cases of Buerger's disease and only two showed a slight decrease in the intermittent claudication and six showed no change. They also stated that many of the patients felt improved during the course of the treatment

but reported no permanent beneficial results when questioned two or more months later.

I noted as have practically all the observers in this work that where the tissues are livid, cyanotic, congested and ready to ulcerate, very low positive and negative pressure should be used.

Theis and Freeland⁷ observed that alternating positive and negative pressure primarily effects the oxygen-carbon dioxide exchange in the tissues. This oxidation process may account for the increased skin temperature. They also state that there is little evidence that circulation is increased, especially in the presence of organic occlusive disease.

Samuels⁸ does not feel the treatment of peripheral vascular diseases is helped by alternating positive and negative pressure.

In our series of 33 cases classified as arteriosclerosis obliterans, 6 have no present symptoms and are classified as cured; 20 were improved and 7 unimproved. The unimproved, averaged 13 treatments; the improved averaged 35 treatments, and the cured averaged 47 treatments.

There is, beyond any question, an elevation of the skin temperature of the extremities after giving suction and pressure. Some workers have also used artificial heat in their suction chambers. Bierman⁹ has observed that with old age the skin temperature becomes lower and the basal metabolism diminished. He also noted that the temperature of the skin surface is lower over the superficial veins than it is over the superficial arteries. Also, in general, the temperature of the skin covering the extremities is lower than the temperature of the skin covering the head and torso. These observations probably partially account for the number of aged referred to and the great number of lower extremities involved.

At this time, as never before, much experimental work is being done on peripheral vascular diseases which includes suction and pressure, intermittent venous compression, injection of tissue extracts, typhoid vaccine and sympathectomy.

We have also treated two cases of frostbite. In both instances very gratifying results were obtained. I am inclined to believe, however, from observation of these cases and after reviewing the literature, that many of the cases of frostbite or frozen feet, probably have a circulatory background due to disease of the peripheral vessels.

Summary and Conclusions

1. Our study based on a series of 50 cases and observed over a period of a year and correlated with the findings of many other workers who had observed their cases over a period of two years or more, conclusively proves that alternating positive and negative pressure in the treatment of peripheral vascular diseases is of great value.

2. A thorough study of each case should be made before treatment is instituted which should include oscillometric readings, roentgenographic study, Wassermann and blood sugar tests.

3. Our best results were obtained from the treatment of leg ulcers and arteriosclerosis obliterans

4. Our percentage of improvement is higher in Buerger's disease than other workers have reported.

5. Passive vascular exercise cannot be considered as a sole cure for peripheral vascular diseases but can definitely be classed as a contributing factor in treatment.

6. Further time must elapse before a final evaluation as to the number of complete cures can be submitted.

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PHYSICAL THERAPY IN INTERNAL MEDICINE

Comments on Its Merits and on Extension of Its Use

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Into the field of treatment commonly called medical as distinguished from surgical have come methods by purely physical means that appear to have earned a permanent place on their own merits. They have met, along the way, opposition which their advocates have succeeded in overcoming by careful research studies and by painstaking clinical observations until now internists generally consider them not only as valuable aids, but frequently as the methods of first choice. Acceptance of these statements leads logically to the conclusion that, in internal medicine, a wider use of physical therapy than is now the fact would be to the best interests of our patients. It is my desire in this brief paper to give my reasons for accordng an enthusiastic welcome to physical therapy, and to offer certain suggestions of my own toward its more extended employment.

Comment can be made by me only from the viewpoint of a practitioner of medicine comparing experience with cases before and after the advent of physical therapy. It happens that I came into practice at a time when physical therapy was unknown as such. That was the period at the opening of the century when medical schools ignored even psychotherapy. Since then, we have gone on into an era in which both physical therapy and psychotherapy have become established and have engaged the attention of the colleges.

Two capacities of physical therapy stand out in my mind. The one is the hastening of reparative processes in certain conditions. The other is the substitution of a safe means of pain relief for medicinal agents in ailments that continue to be painful over considerable periods of time.

I have observed that recovery from myalgias, neuralgias, sciatica, and some of the arthritides frequently is quicker than in the days before diathermy coupled with radiant heat and massage was employed. I make this broad

general statement without in any way forgetting the necessary search for causes and their removal or appropriate treatment of general or focal infection or metabolic irregularities.

In some of the joint affections it should be noted also that, where older methods of treatment failed to prevent crippling, newer management has been able, at times, to save some of these cases from total incapacity.

Physical Therapy vs. Drugs

Much more important is the second value postulated, the use of physical therapy to alleviate pain instead of resort to drugs alone. Reference here is not made to opium whose dangers for other than temporary use are well known to all physicians, but to the salicylates and the barbiturates which are not generally thought to be fraught with great danger to the organism. That these drugs, when used in ordinary dosage over considerable periods of time, are harmful is a conclusion that I have been unable to avoid as a result of a number of experiences. For instance, a sufferer in her fifties from chronic non-crippling arthritis came to my attention after an aspirin habit had been established for some years. This woman's equilibrium, vasomotor control, and emotional stability were seriously disturbed, and the ordinary degenerative changes of the decade seemed to have been accelerated. Cessation of salicylate self-medication altered the whole situation. Again the temptation to secure sleep in the presence of uncomfortable somatic conditions is insidious and barbituric acid derivatives come into the picture. Largely, the unfortunate results of long continued use of moderate dosage of barbiturates appear mainly as personality troubles, either creating these or magnifying maladjustments already existing. In such cases, psychotherapy is useless until the toxic state due to the drug is removed and the case can be managed by the required combined treatment of somatic and psychic deviations. Would it not be vastly better that every safe aid which can minimize pain by influencing the disease processes physically be sought rather than that chronic patients be thus allowed to court incapacity from medication?

I would not like to be dubbed a "medical nihilist," a term which was applied in the end of the last century to those physicians who, seeking rational bases for medication in the place of the worn-out "polypharmacy," became over-pessimistic about all medicines. On the contrary, I can only be thankful for the salicylates and barbiturates; but I prefer physical measures for pain whenever they can either replace these drugs or shorten the temporary period of their useful medication.

Extension of Physical Therapy in Internal Medicine

When one asserts that physical therapy does not enjoy as wide general use for the purposes named or as effective administration he must prove this point, and is also under obligation to make constructive suggestions. The two duties seem to go hand in hand since presentation of the reasons for non-use or poor use of physical measures will probably carry implications for correction of our attitude or methods of practice that lead to failure.

Immediately, there comes to mind the possibility that many physicians have used physical measures rather as a last resort when other methods of treatment failed to bring satisfactory improvement. I am sure that I have done this myself, and undoubtedly other practitioners have done the same thing. The answer appears to be that the therapeutic plan, when diagnosis is made, should always consider physical therapy as one of the agents of potential value — perhaps at times the best — to achieve quick relief. In other words, our attitude toward the value of this form of therapy seems to need some change of greater or lesser degree.

Next comes the problem of the cost of this work. Equipment is expensive, technician aids must be employed. Only too often patients raise objections on this score. Undoubtedly this constitutes a real economic problem; but it is one that should include for the patient and his physician a weighing of cost against accomplishment. The decision for or against an operation of election is dramatic in a way that does not exist in the ailments under discussion. It is for the physician to teach his patients, particularly where the issue is not so clear cut as between a "prescription" and repeated treatment sances.

Not so often thought of, I believe, is the element of time involved in application of proper physical therapy procedures. A complicated problem follows on the fact that success with these measures calls for sufficient time for all work that may be needed. Usually this means not less than an hour under treatment. While the invalid unable to work can afford this, as well as the time consumed in transit, those not so hampered can ill afford to be away so long from their occupations or other duties. To be sure, the hours so spent will often actually save time in the long run; but the patient must be convinced. Again it is the physician's task to educate.

Time expenditure is a problem also for the physician. Unless he can devote all this needed time, his efforts will fall short of full success. In an urban community a physician doing internal medical practice will usually soon learn to refer his patients to those who specialize rather than himself struggle to fit such treatments into his office hours. In rural areas the solution of the problem is not so simple.

There can be no doubt that specialization supplies one demand of real importance. Given every diagnostic analysis needed, there is still required judgment which experience alone can give to choose the appropriate measures and to estimate frequency and duration of a course of treatment.

Right here I must propound a question which I cannot answer. Can the profession be so well taught the fundamentals of physical therapy in medical school and its application in hospital that our future physicians can derive the most benefit of such therapy? In other words can the general practitioner be expected to replace in large measure the specialist in physical therapy? Certainly, he cannot now do so because as a rule he has not been trained.

At the present time the whole problem of more extended use of physical measures seems to call for team work of a kind that will recognize the elements of time consumption and convenience for physician and patient alike, the overhead cost as distributed among the patients and finally closer co-operation between the practitioner and the specialist in physical therapy.

I crave indulgence to digress somewhat to register objection to the name Physical Medicine that has recently come into use instead of Physical Therapy. Physical Therapy seems to me good because it means just what it says, treatment by physical measures; but the other is confusing and I think rests on an unsound basis. Medicine in common usage means the whole science and art including many varieties of treatment with their own terminologies. Only one departure from this rule exists:—Internal Medicine—and in that case the word medicine implies also the whole knowledge of causation, diagnosis and treatment of diseases whose treatment is primarily non-surgical. Furthermore, all treatment except psychotherapy is physical in a somatic sense; and psychotherapy itself is only a branch of medicine as a whole. If the new title was devised to aid physical therapy to attain a higher level of importance, I think it unnecessary because already acceptance has been gained on intrinsic worth.

IONIZATION OF ALLERGIC RHINITIS *

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Ionization of the nasal mucous membrane for the office treatment of allergic rhinitis has been employed by me for the past three years. This report deals with a series of 75 cases, of which 24 were autumnal hay fever; 19 had spring hay fever; and 32 were cases of allergic rhinitis due to other causes. All of these cases were treated after the onset of symptoms. The same technic has been followed throughout, i. e., the nose packed with strips of cotton soaked in 1 per cent zinc sulphate, an electrode attached to the galvanic machine and 10 ma. applied steadily for ten minutes to each side. In some cases both sides were treated at one sitting, but in the majority an interval of two or three days elapsed between treatments. An analysis of the results obtained with this form of therapy was as follows:

Among the cases of autumnal hay fever, four were completely relieved, nine were improved and eleven received no relief.

Among the 19 cases of the spring type, five were completely relieved, ten were improved and four derived no benefit.

Of the cases due to allergic rhinitis from other causes than pollen, six were relieved, fourteen were improved and twelve failed to obtain any relief.

In attempting to evaluate the results of the treatment of allergic rhinitis, it is not to be expected that any more than a general idea of the efficacy of the various agents can be realized, because so many factors enter into consideration. The personal equation is important and is so varied that it is almost necessary to consider each case in detail to convey an accurate picture. Weather conditions, contacts, food and environment play essential roles.

A discussion of the cases here reported is necessary to explain as far as possible the conclusions reached.

Four cases of autumnal hay fever are reported as completely relieved. These four patients were benefited to such an extent that they believed a cure had been obtained. I have no doubt that these patients sneezed during the season, but they were highly elated with the results.

Nine cases are reported in which improvement occurred. Every patient who received any benefit from the treatment is included in this group. Some of them were relieved for a week or 10 days and others thought the symptoms were ameliorated slightly. It is only fair to consider the other factors influencing the course of hay fever which have been mentioned as possible causes of the temporary cessation of symptoms.

Eleven patients received no help from the treatment, but none of them was made worse.

In considering the report of the spring hay fever cases, almost the same observations may be made with the additional fact that three of these patients who were completely relieved during one season returned for treatment the following year and received no benefit whatever.

Furthermore it was my impression before I went over the records that a much larger percentage of cases of spring hay fever had been relieved completely, but the results are not much better than the cases belonging to the fall type group. When we deal with the perennial cases, we find that 6 patients are cited as cured or completely relieved. Two of these pa-

* Read at the Sixteenth Annual Session of the American Congress of Physical Therapy, Cincinnati, Ohio, September 22, 1937.

tients were not heard from after 3 months and 6 months, respectively, so that we are not sure that they remain free from symptoms at the present time. The other four have been followed for 3 months to 11 months and remain free from distressing symptoms and feel that a cure has been obtained. Fourteen patients in this group were improved. Unfortunately many of them received help for only a week or ten days. A few of them felt that the symptoms had abated somewhat over a long period. In all of these cases a careful history was taken and instruction given the patients regarding the nature of the malady with advice as to the avoidance of the causes. Twelve patients in this group failed to obtain any results.

With this picture before us it is justifiable in my opinion to reach fairly accurate conclusions. We have observed that very few of the patients who were classed as cured, returned the following year for the treatment in spite of the fact that we were aware that the hay fever had recurred. The hope that the relief would be permanent kept some of them away, and the other deterring factor I believe to be the distress incurred during the treatment. The treatment does make an already unhappy patient extremely uncomfortable for some hours.

From a clinical point of view nasal examination following the treatment does not disclose any damage to the mucosa. We all are aware of the microscopic studies which have shown injury to the nasal mucosa. Therefore, we should not use the treatment indiscriminately nor too often. I am convinced that the swelling and stasis produced by allergic disease is more harmful than the application of the zinc solution.

The patients who have spring or fall hay fever should be treated with antigens and local methods reserved for those cases in which other methods have failed.

The patients with allergic rhinitis due to inhalants or foods should be studied carefully and desensitized when indicated. I am sure that much better results will be obtained with rational methods than can be obtained by ionization in the vast majority of cases.

Carew Tower.

(Editorial comment: This brief report which essentially is a negation of the value of zinc ionization of the nose for allergic conditions represents individual experience of interest to collective statistics. While other observers have reported a comparatively large percentage of cases with prolonged palliation of symptoms virtually amounting to a clinical cure, certainly the last word has not yet been spoken on this rather complicated problem. Every experienced rhinologist has met with failures as well as successes with one and the same technic, which can only be interpreted as proof that the mere grouping of patients as "hay fever," "hyperesthetic rhinitis" and the like is in itself clinically inadequate. The task with which one is confronted and which will have to be completed in the future is to make detailed diagnoses both with regard to etiologic factors and the variations of the underlying pathological processes. Only in this way will there eventually become available a means of selection of those cases that are suitable for ionization and rejection of those that cannot be benefited by this therapeutic procedure. It is only by restricting zinc or other metallic ionization to the former that a real evaluation of its efficacy will be attainable.

POSTURAL EDUCATION *

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DETROIT

This paper is a non-critical review of the literature on posture and body mechanics for the past decade with a description in detail of the system of postural education at the United States Naval Academy at Annapolis.

Richardson and Hayes¹ state that any one who gives the slightest thought to the posture of almost any group of young people must admit that it is uniformly bad. With the exception of the U. S. Military and Naval Academies and perhaps two or three of the better private military schools, it is rare to see any attempt on the part of young people to hold themselves as they should do for reasons of health or for appearance.

The present system of postural education at the United States Naval Academy has been applied since 1921. In that period, over 25,000 postural studies have been made,—each and every one extending over a length of two years for each individual man. As described by Mott,² the entering midshipman is sent to the photographer who takes his picture on the posturegraph. Three exposures, anterior, posterior and lateral, are made. The defects are enumerated on a form, and the midshipman and the gymnasium medical officer go over the defects as pictured. The midshipman is then given his strength-test chart, and the medical officer points out the various muscle groups. The midshipman marks with ink on the posture picture any defects he may have. The exercises recommended to correct strength defects are checked, and the paragraphs relating to correct posture are marked and called particularly to the midshipman's attention.

This method was followed when the writer was athletic medical officer at the Naval Academy. Men who required corrective exercises were put in a posture squad, and given special work. They could graduate from this squad by showing definite improvement in both the physical side of posture and in an understanding of what correct posture was. All midshipmen repeated this process at the end of two years, and the two sets of pictures taken two years apart were checked with one another and against the man himself. The pictorial record of his improvement always made a great impression on a midshipman, and also on the midshipman's parents.

Correct Posture

Definitions of good posture vary in some slight details, but the fundamental principles of good form are evident in all. Schwartz³ says there is lack of agreement in the various standards and tests of good posture, and he quotes the American Posture League as saying, Good posture is that in which the different segments of the body are balanced vertically on each other so that a vertical line will pass through the ear, shoulder, hip, and foot. Haynes⁴ believes that in man the normal posture of the head is in standing about midway between the maximum and minimum position for the labyrinthine reflexes. Harmony must be created between the manner in which the cortex directs the body and that which the lower centers have been accustomed to from time immemorial, so that the phasic control of the muscles may agree with the reflex control. Heiner's⁵ idea is that good posture consists in standing so that a vertical line passes through ear, shoulder-joint, hip-joint, knee-joint and ball of foot. Ewerhardt⁶ explains

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that the main factors as to what constitutes a so-called normal position are to approximate as closely as possible the main segments of the body to a perpendicular line, to carry the body as erect as possible, and to maintain this position in ease and comfort. Mott⁷ states that the posture which we now recognize as being the best from an economic standpoint is one of balance, in which the pull and contrapull are so well equalized that the trunk is well balanced upon the hips, and the entire weight well carried upon the foot. Neel⁸ describes position No. 2, a simple drill for erect posture in children. (1) Head high. (2) Weight evenly balanced. (3) Arms falling at sides. (4) Abdomen in. Taylor⁹ presents the fact that there are examples without number of officers in today's Navy who have graduated from the Naval Academy in years gone by who are in better physical condition than can be expected for their age and service. The secret of this lies in the fact that the Government requires that its officers and men keep physically fit at all times. As a check-up on this, every officer is given a thorough physical examination once a year. Rugh¹⁰ advises that in the matter of prevention of deformities there are three chief essentials. (1) Recognize the deformity or its potentialities. (2) Search out the cause, whether mechanical, pathologic, or anatomic. (3) Consider no efforts or personal endeavor too great which will aid the patient in overcoming the threatening disability, and restore balance to a part, so that the normal growth and development will insure normal function to the entire body. Milliken's¹¹ experience has been that school instruction and training in proper body mechanics and posture will produce a great reduction in adult disability. Schwartz, Britton and Thompson¹² find the effects of exercise on adolescent boys to be (1) more rapid development in height and weight (2) vital capacities increased. Richardson and Hearn¹³ emphasize the preponderance of poor posture in very young children. Klein and Thomas,¹⁴ in a study of 1708 Massachusetts school children state their results. (1) At the first examination, most of the children had poor body mechanics. (2) The prevalence of poor body mechanics was strikingly reduced by posture training. (3) Improvement in body mechanics was associated with improvement in health and efficiency and improvement in school work. Schwartz, Britton and Thompson,¹⁵ after a study of 2200 New York school children, say: Children do not start life with a single type of posture, later developing differences as a result of adverse environmental influences; but, on the other hand, show marked differences early in life. Although the group as a whole was a fairly healthy one, a record of physical impairments was obtained and checked against posture measurements. A complete absence of relationship was found. The inadequacy of the comparison was recognized in view of the general good health of the entire group. Abdominal exercises tending to correct an exaggerated lumbar curve may improve posture and health. In Schwartz's study, only profile photographs were used. At the Naval Academy, fore and aft photographs are used in addition to profile. The Metropolitan Life Insurance Company¹⁶ record that good posture and strong feet cannot be maintained by will-power alone. Trained and adequate muscles are essential. Thomas¹⁷ maintains that if we can hope and expect the teaching of body mechanics to grow as rapidly as it should in the field of physical education, that physical therapists will have to make so clear its importance that more educators will be interested in finding teaching methods of their own. In the White House Conference on Child Health and Protection,¹⁸ the sub-committee on body mechanics came to these sterling conclusions: (1) That steps be taken to inform and persuade the public of the importance of good body mechanics to the health and well-being of children. (2) That steps be taken to make it not only possible, but compulsory, for all the children in the United States to receive instruction in good body mechanics. (3) That steps be taken to provide for all the children of the United States exhibiting poor body mechanics to receive instruction in good body mechanics. Good Posture In The Little Child¹⁹ says the child who is well nourished and rosy-cheeked, who

is alert and vigorous in play, is likely to be the child who holds his body well-poised and balanced. The child who is thin, pale, listless, and always tired is likely to be the child who stands in a slouchy, drooping position such as is commonly called fatigue posture. Kellogg²⁰ concludes, in the study of posture I assume, as a fundamental proposition, that the pelvis is a pedestal upon which the torso is balanced.

I believe that the ideal of posture is the same for all, and the time to start its attainment is in babyhood. Builds of human beings vary, but the structural principles are the same for all. The mechanical laws which provide for the alignment of the great trusses which support the spine on the pelvis and the head on the spine are the same for all. The rules which the writer uses for teaching standing posture are: (1) Heels together, toes at a forty-five degree angle. (2) Contract the buttock muscles slightly. (3) Clasp the forefingers lightly together behind the buttocks. (4) Raise the chest. (5) Release the hands, relax the arms, and let gravity determine their position. This is a posture easy to retain. It has no suggestion of a brace or of rigidity in any way, and permits of a free stride in walking. The slight contraction of the buttock muscles flattens the pelvic obliquity, and is no more than the tonic state induced in these muscles by walking.

Measurements, Muscle Groups, and Exercises

Lowman²¹ advocates that routine physical examination should include inspection of the child's nude body, in sitting, standing, and lying positions. Plumb-line measurements from the bony landmarks of the pelvis to the bony landmarks of the extremities and the ground will show up structural faults. Kraus²² says the muscles that must be in action to maintain the trunk fully extended are the axial group. The erector spinae is the most powerfully developed in man, and is the muscle of human erectness. For erectness, the dorsal musculature is required to act more predominantly in man than in the lower animals. When it is desired to increase the erectness, the dorsal axial muscles are used. One of McCurdy's²³ methods of exercise is the use of short static contractions which may be defined as the holding with increases of body-weight of muscles in the short contracted position. The value of this system is shown in the beautiful, graceful, straight-backed posture of the women of primitive races who carry their burdens on their heads, jars of wine and olives, baskets of oranges and limes; as they walk miles to and from the market-place with easy tireless strides, their spines as erect as the boles of the palm trees which border their way. Hansson²⁴ says it is very important to remember that the human race is weak on extension. We are born in flexion, and old age sees us again in flexion. If the spine is strong, the body instinctively pursuing its spontaneous search after convenience, will assume the position of correct posture. The exercises of wrestling are compulsory at West Point and Annapolis, and it is not too much to believe that the development of the splenius capitis, the sacro-spinalis group, and the psoas which occurs at this time has much to do with preserving the erect carriage of military men.

Consider the wrestler. He lives to a good old age with a fine straight back, a strong neck and a powerful pelvis. The famous William Muldoon carried his power and vigor well past the eighty-year mark. In no other one of the so-called big-muscle group of sports can a middle-aged man compete with youth and hope to hold his own. There is a reason for the wrestler's durability, and also a reason for his perfect health and fine physique, which make the weight of advancing years sit lightly upon his massive shoulders. The secret lies in the basic exercise of his kind, the well-known wrestler's bridge, which he practices hours at a time. Go into a gymnasium and watch him as he arches his back high in the air, and teeters back and forth with only his feet and head touching

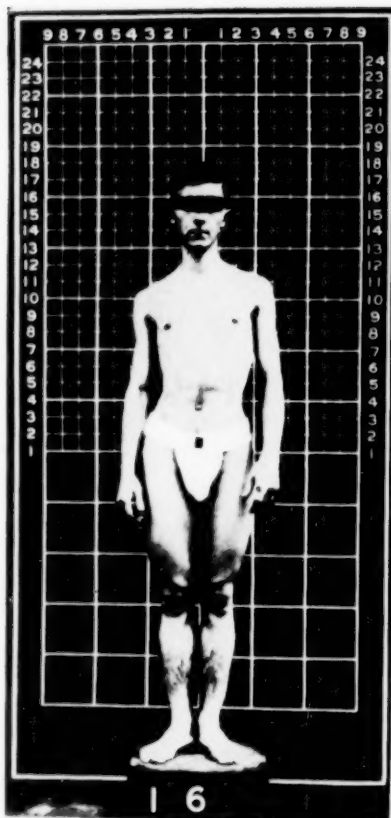


Fig. 1.— Before posture training.

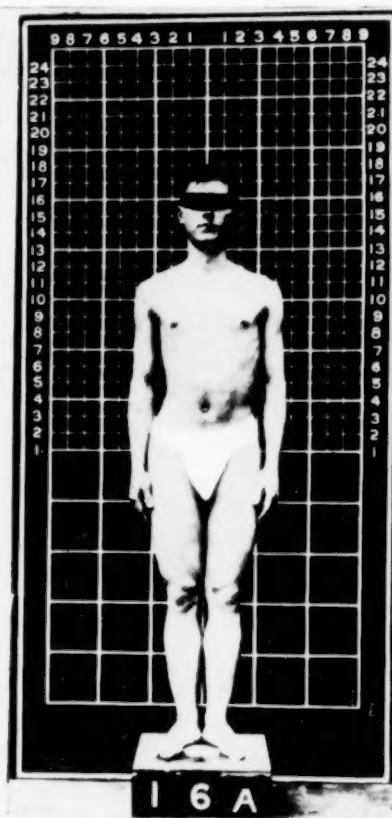


Fig. 2.— After six months postural education.

the mat. This exercise builds up the axial musculature, the importance of which is mentioned by Kraus. It counteracts the tendency of man to return to the posture of the primate. A baby first crawls before it becomes erect. An old man first loses his erectness by a forward bending of the spine. Erectness is the last structural function to come and the first to go.

Recent Posture Studies

Garner²⁵ believes that slouching posture plays a dual role in its effect upon the female pelvic organs. Circulation as a whole being retarded, and the blood improperly oxygenated, the organs receive a diminished supply of impoverished blood. The flattening of the chest walls, together with restriction of motion decreases the thoracic capacity to such an extent that the active inspiration is only permissible by forcing down the diaphragm. This results in an increase of intra-abdominal pressure, partially compensated for by a protrusion of the abdomen, forcing downward into the pelvis the mass of intestines which press directly upon the uterus, tubes and ovaries. For a time the effect upon these organs is transient, but as faulty posture is persisted in, the pressure from above becomes constant; the supporting ligaments of the uterus lose their elasticity and become elongated, and displacements follow.

Goldthwaite²⁶ believes the appropriate treatment of non-operative and post-operative cases is medically supervised physical therapy, and he says, "In our own special line of work with the great interest in the operative side of the work, with the general indifference to the non-operative, or to the operative case once

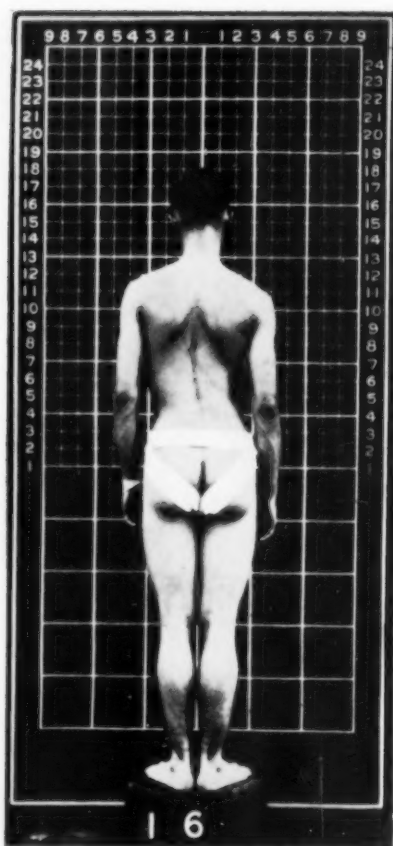


Fig. 3. — Before posture training.

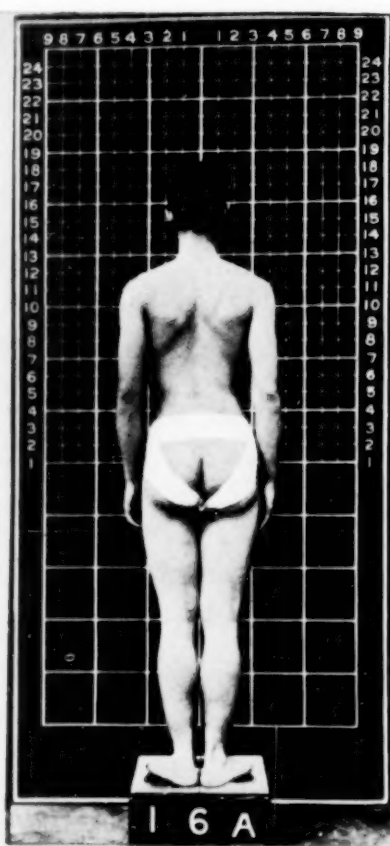


Fig. 4. — After six months postural education.

the operation is performed, one can but wonder if the basic ideals which justify our work have not been lost sight of."

The conclusions of Brown and Kuhns²⁷ are that painful conditions about the shoulder joint are commonly associated with the forward-drooped position of the shoulder girdle. The mechanics of the shoulder girdle are such that with the drooped position of the body as a whole, the habitual position of the shoulder is one of constant strain upon the structures which stabilize the shoulder-joints. The correction of the drooped position of the body as well as the position in which the shoulder is habitually used, should be an essential part of the treatment in disabling conditions about the shoulder.

Appleton's²⁸ experiments on rabbits showed that persistent adoption of faulty posture modifies the normal course of growth changes in the limb-bones of healthy animals. La Place and Nicholson²⁹ write that due to the correction of faulty postures (1) the vital capacity is generally enhanced, (2) pulmonary ventilation is generally increased, (3) circulatory efficiency is generally improved. Badgley³⁰ says: "My chief concern about the normal growing child naturally centers in his posture. In my clientele, it is apparent that the framework of the child has not been examined by the parents or the physician from the time the child has been old enough to dress himself. Yale and Harvard freshmen showed postural deformities in 85 per cent of the students. School children showed lateral postural defects in 34 to 48 per cent. There is sufficient reason to feel that it is this group of children who may prove to be pre-scoliotic. Investigation of

the ultimate outcome of this group would prove of the greatest value in the treatment of scoliosis. I know of no statistical study to prove or disprove this theory. It is one well worth making."

Osgood's³¹ comment is: Of the surprising prevalence of faulty body mechanics and poor posture there can be no doubt. Of the close association of good body mechanics and good functional health and of poor body mechanics and poor functional health, the physiologic basis is sound and the clinical evidence is strong. The underlying causes of poor body mechanics need investigation; but, whatever these causes may be, the conversion of poor body mechanics into good body mechanics seems to be possible in the vast majority of cases and the retention of good body mechanics after adequate training in its principles seems to be a reasonable expectation.

If these ideals are realized, one may expect the future race to be more healthy and better balanced than the present humiliating physical race revealed by the universal draft of the World War and by every informed survey of the youth of the nation.

Summary

1. The weight of authoritative opinion in the realm of body mechanics is that postural defects tend to become structural, with resultant concomitant infirmity.
2. Education in body mechanics and corrective exercise to remedy the postural defects of youth will prevent such defects from becoming structural.
3. More postural studies in the child-group should be made and the results checked over a period of years.

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COMMON CAUSES OF FAILURE FROM COLONIC THERAPY *

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In a previous paper I developed the thesis that colonic therapy as a specialized system of treatment of chronic intestinal toxemia was theoretically the most logical and actually the most successful method of attacking this syndrome. It is my purpose today to mention some of the common causes of failure through the use of this therapy with suggestions for their avoidance. With this as with any other system of therapy, failures are bound to occur. However, there are always reasons, and these may be found if diligently sought. It is important that the cause of every failure be found, for this will lead either to a change in therapy or to an understanding of why good results are impossible, i. e., to a revised diagnosis.

There are, of course, many reasons for failure which should never be allowed to materialize, such for example as a wrong or incomplete diagnosis, the application of colonic therapy in conditions where it is not indicated, poor technic, or poor management. There are, however, other causes of failure not easily recognized, which may be learned only through close observation and study of many cases, and the habit of making comparisons and classifications.

The physician who installs a colon irrigating apparatus merely because he has become convinced of the value of these treatments yet is unwilling personally to master the technic should never undertake this work at all, for he will inevitably lose interest and give up this method of therapy altogether. To be successful in this as in anything else, interest must be deep,

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dynamic and unwaning, for the subject is too great and too technical to be undertaken lightly. One's conviction in the fundamental correctness of the basic principles upon which this therapy is founded must be great enough to survive all discouragements. Failures there will be, and many of them unpredictable and unalterable, yet one must assume no other attitude than that every failure is a personal failure and not a fallacy in the theory. The theory is flexible enough to meet all situations as I have been forced to relearn many times.

In the first place it must be thoroughly understood that colon irrigations alone rarely produce permanent results. There are, however, exceptions to this rule, as previously noted. Next we must realize that colonic therapy is not a cure-all. Cases for treatment by this regime must be carefully selected, which naturally presupposes a thorough diagnostic study, a knowledge of the indications and contraindications for this therapy, and the realization that "colonic therapy" as previously defined means much more than a series of colon irrigations. Finally, we should anticipate as many common causes of failure as possible and forestall them from the beginning. When this has been done it will be much easier to find the causes which could not have been anticipated in cases where failure is threatened.

Diagnostic Investigation

At the initial visit of the patient the following points should be settled as definitely as possible — constitutional type, duration of the present illness, fixation of the date when earliest symptoms bearing on the present condition occurred, and attitude of the patient toward his illness as expressed by his willingness to co-operate in every way. This last point is exceedingly important. The patient should be made to understand that while most cases show great improvement at first, the permanency of a cure will depend upon carefully following instructions and reporting at stated intervals for a period varying from six months to a year or more. If he is unwilling to agree to this arrangement he should be told that any improvement he might receive during a short course of treatments would probably not endure.

I find that one common cause of dissatisfaction, not only on the part of the patient but on the part of some physicians as well, is that they expect too much and expect it too quickly — apparently from the magic of a series of irrigations alone. Disappointment tends to create in the patient a lack of confidence in his physician, and in the physician a lagging interest in the therapy. Under such circumstances it becomes difficult for the physician to hold the patient long enough to work out all phases of the regime. It is important that the physician acquire a background of knowledge and experience as early as possible, so that he may be able to speak authoritatively to the patient and inspire him with faith and courage. It must be borne in mind that mental depression and easy discouragement are very common symptoms of this syndrome.

Dissatisfaction on the part of the patient is very commonly the result of misconception as to the reasons for so many colon treatments over a short period. It often helps therefore to spend a few minutes in outlining what must be done, and why. It must be explained to him that the object of these treatments is not merely to empty and cleanse the colon which ordinarily could be done in four to six treatments, but to aid in drainage of the deeper tissues to which the poisons have penetrated, and finally to assist in restoring to normal the functions not only of the colon but of the liver, lymphatics and other cellular structures. He should be told in advance that he may feel worse after the first few treatments, the reason be-

ing that during the process of softening and loosening mucus and old accumulations of fecal material absorption of poison is increased. He should be told that after the first week he will begin to feel better again, but that treatments must be continued till all purposes are accomplished, failing which there would undoubtedly be a return of the original condition.

Care of Associated Conditions

The anus and rectum should always be examined at the first visit to be sure there is no local pathologic process which would predispose to further trouble as soon as the irrigations were finished. A Brinkerhoff speculum, not less than one inch in diameter at its base, should be inserted to determine the dilatibility of the anus. We frequently find that the stools have been kept liquid by catharsis or mucous stools so long that fibrotic changes have taken place in the skin, connective tissue and sphincter muscles. If the speculum cannot readily be inserted full length without splitting the skin and mucous membrane, or causing undue pain, it may be necessary to forcibly dilate these structures or even cut through the pectineal band of fibrous tissue. Crypts should be laid open if they harbor infection, and the incision brought down to a point where it may be seen from the outside. Hemorrhoids, fissures and fistulae should be properly dealt with either before or directly after a series of irrigations.

Foci of infection elsewhere in the body such as in the tonsils or teeth must be carefully appraised. I have on several occasions been misled by apparently normal tonsils and teeth only to have the patient leave me after a month or two still complaining of toxic symptoms. It is very humiliating to meet these patients six months later in perfect health and have them tell you that they had been to another doctor who advised them to have their tonsils removed, which they did, and were relieved of all symptoms. It is small comfort to cherish the thought that possibly they would not have gained this quick relief if they had not received their colon treatments first. The appendix and gallbladder can wait, as these often give no trouble after a series of irrigations. However, I have found it necessary at times to have the gallbladder removed, rarely the appendix.

As previously stated toxemia may be so pronounced at first that it completely obscures symptoms which might otherwise direct our attention to predisposing causes. During and following a series of irrigations however these causes generally manifest themselves. This indicates how important it is not to delegate the treatments to a technician without personally keeping a close watch upon the patient. Extreme fatigue or exhaustion may develop after a few treatments, thus indicating an unstable or exhausted adreno-sympathetic system. Spasticity may increase as treatments continue, calling for careful appraisal of central, vagal and sympathetic influences, and appropriate measures to control them. It may be necessary to stop treatments altogether for a while and put the patient to bed for a complete rest. I have seen such cases go into a nervous collapse lasting for many months when these warning signs were disregarded. It must be remembered that daily or frequent irrigations strongly affect the autonomic nervous system, and when combined with a temporarily increased toxic absorption may be the straw that breaks the camel's back, for many of these patients come for colon therapy only as a last resort, after everything else has been tried and failed.

Rest, relaxation and freedom from the usual strains and stresses of competitive existence during the early intensive treatment are as vital to the success of this therapy as the control of any predisposing cause. Looking back over the years I am able to point out several glaring failures which

can be credited solely to infringement of this rule. One, a woman executive who received fifteen or sixteen treatments, but continued to work under pressure as hard as ever. She was spastic at all times and just could not relax or take a minute to rest. There was no other predisposing cause that could be found. The toxemia was controlled for the duration of the treatments only. She never returned for observation or advice, and, of course, received no lasting benefit. On the contrary the treatments had increased her exhaustion. The other cases are almost exact repetitions of the above. Rest, particularly during treatments must be insisted upon. The follow-up treatment must also stress the great importance of learning how to relax, for in these people especially, the condition of the central nervous system is quickly transmitted to the autonomic.

It will be found that many patients have been taking bran, roughage, enemas, cathartics, mineral oil for months or years. When irrigations are begun these should all be stopped and the patient put upon a smooth diet. Failure to follow the diet is apt to cause irritability of the colon resulting in either loose movements or spasticity. During the treatments roughage seems to produce more signs of irritability than it normally would, due no doubt to the effect of the irrigations in temporarily increasing the general colon activity, and to the increased irritability of the colon mucosa following a treatment. I do not allow my patients to drink milk or eat chicken during a course of irrigations. These foods if they reach the colon undigested, as they are apt to do at times, seem to form excellent culture media for putrefactive bacteria.

Correct Management

At the end of the first week I usually start supportive medication of some kind to offset the "let-down" feeling that is apt to appear as soon as the toxemia is somewhat relieved, and to bolster the adreno-sympathetic system which at this time begins to show signs of mild exhaustion. Vitamines B1 and B2 are prescribed in many cases early and in large doses; and in some cases with evident malnutrition, vitamins A, B, C, and D, are given, since it is evident that absorption and utilization of these factors as well as of food has been impaired.

Faulty technic and poor judgment in the application of otherwise good technic are undoubtedly common causes of unsatisfactory results. Irrigation should always be adapted to the case in hand, both in respect to method used, the temperature, nature and quantity of solutions and the length of treatment. One must be capable of fitting the treatment to the patient and of altering his judgment and changing the technic during the treatment, if such change appears to be indicated. This may sound complicated but really is not, for with a flexible unit one may vary the details to meet changing conditions. One becomes accustomed to thinking of what one desires to accomplish rather than of the particular method one should use in doing so, and then just automatically accomplishes it. The limitations are measured largely by those of equipment.

The technic of the series may also be at fault. What should be the frequency of the treatments, the total number, the intervals between treatments, the nature of the solutions used for instillation, and in what sequence? At just what moment should irrigation be stopped and instillation of a medicated solution introduced? These questions and many more must be correctly answered. Of course, it is possible for two different technicians to use entirely different methods and both obtain excellent results. Without in the slightest degree attempting to describe my own technic, which varies almost with every patient and therefore would defy description, I will at-

tempt to touch the high spots only of my usual routine, in order to bring out a few points which I consider important.

I use a three gallon jar filled with tap water at body temperature, and a smaller jar filled with a quart of medicated solution at a temperature to suit my purpose, varying from 105 to 122 F. These are connected to a reversible valve and led to a No. 32 French flexible tube long enough to reach beyond the splenic flexure if necessary. The water in the large jar is used for irrigating the colon and for advancing the tube — that in the small jar for instillation. Depending upon the nature of the affection I advance the tube to the splenic flexure or beyond, drain off all excess solution and immediately introduce a quart of hot medicated solution, or I irrigate with the tip of the tube in the rectum until I am satisfied I have filled and emptied the cecum at least once, then waiting until excitability of the colon has somewhat subsided I introduce the medicated solution. Should a contraction occur during instillation the flow of the medicated solution is stopped momentarily until relaxation is regained. One or two contractions may occur when introduction is made directly into the rectum. Following such contraction there is usually a period of relaxation sufficiently long to permit the solution to reach the proximal colon and ultimately the cecum. There are, however, cases in which I prefer to use the metal applicator and suction as provided in the Dierker apparatus.

All cases should be treated daily for the first week if possible, in order to thoroughly empty and cleanse the entire colon. If this cannot be arranged not less than five treatments should be planned over a period of seven days. Treatments should not be started until such arrangements can be made. The reason for this is that during the period of cleansing and emptying of the colon the greatest value is the cumulative effect of frequently repeated treatments. The colon is stimulated to unusual activity at the time of each irrigation, and the effect of the medicated instillation is continued for some hours beyond this time. The colon is not permitted to load up between treatments and the process of softening and loosening mucus, old residues and interlining adhesions goes on uninterruptedly. Were advantage not taken of these facts not only would the value of the preceeding treatment be partly lost, but the patient would tend to become more toxic. Furthermore control over the patient during the most critical period of the series would be impossible. Should his bowels not move, or should he be troubled with gas or cramps which is not uncommon, he would be tempted to take an enema or a cathartic and possibly fail to return at all, believing this form of therapy not suited to him. He would have formed a completely erroneous idea of the therapy and have little good to say about it to his friends.

Each patient should be given definite instruction at the first irrigation and be made to realize the importance of carrying them out to the letter. Treatments during the second and third week may be given every other day. After this they may be stopped altogether or the intervals lengthened according to indications.

Rotation of the medicated solutions given from the small jar follows no fixed order. An arbitrary sequence which I vary at will is as follows: neo-silvol, 30 grains to the quart; sodium carbonate, one dram to the quart; acid sodium phosphate, one-half ounce to the quart; potassium permanganate, 1 to 8,000; zonite, one ounce to the quart; sodium thiosulphate, one ounce to the quart; then repetitions and variations of the last four mentioned, and finally four ounces of a heavy liquid culture of *B. acidophilus* in a quart of hot water (115 F.).

The belief is current, and with some justification no doubt, that a series

of colon irrigations will cure constipation. It is true that a large percentage of those coming for treatment are and have been constipated for years, and it is also true that as a result of therapy and re-education constipation is relieved. Yet constipation per se is not an indication for colonic therapy and its relief is but incidental to the main objective. Nevertheless since restored health coincides with normal bowel function, a casual relationship is assumed, and the patient is therefore prone to gauge the success of the therapy by the degree of improvement in his colon activity. On the other hand patients who have been having two or three mucous or liquid stools daily for many months may be greatly benefited by the treatment, yet in the end complain that their bowels had been normal before taking the treatments but are now constipated. It is therefore not wise to make promises or to permit the idea to become too firmly rooted that relief of constipation is the correct gauge of successful therapy.

I find that it is necessary in many cases to prescribe a mild mechanically-acting bulk laxative for a while (oil, agar, kaolin, bassorin, either singly or in combination) until the natural influences of habit, improved tone, returned vigor, and a normal flora and functional rhythm have become well established. Some cases will require a little mild stimulation in addition. For this one may prescribe cascara, senna, rhubarb, milk of magnesia, or bile salts, always remembering that the mildest laxative which will do the work is the best. A good rule to follow is to use such a laxative at bed time on any day in which there has been no evacuation.

Stasis in any degree should not be allowed to develop following a course of irrigations, for in this event it would be very easy for the original condition to recur. Enemas during or following a series of irrigations should be strictly forbidden, not only because a pernicious habit may be acquired but also because there is nothing better calculated to upset everything that colonic therapy is endeavoring to accomplish. Yet in the judgment of the physician an irrigation may be given periodically to relieve a weak, overburdened proximal colon until it has gained in strength, tone and resiliency sufficiently to take care of itself.

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Discussion

Dr. C. W. Heald (Battle Creek, Mich.): In treatment we should always recognize the fact, especially when we are considering physical therapy, that there is always more than one thing operating for the improvement of the patient. For instance, the diet should be properly directed, thus keeping up the nutrition of the individual. Rest should be encouraged and possibly massage is being given along with other hydiatic treatments as well as the colon therapy. To evaluate what each remedy has accomplished singly is rather difficult. The enema is one of the oldest forms of therapeutic agents and I think there is no other simple thing that we can do for a patient suffering from minor ailments that will give so much relief as the simple enema or possibly a colon irrigation.

The author states early in his paper that an incomplete or a wrong diagnosis may be one of the causes of failure in this type of treatment. I certainly agree with him in this respect.

Every one attempting to treat intestinal disorders should have quite definite-

ly in mind a classification in which this type of therapy might be indicated.

If we are going to treat intestinal stasis intelligently by enemas we should at least have some idea as to the type that we are dealing with. The rectal type I think can be handled very nicely by the simple oil enema or by injecting a very small amount of water into the rectum. This type is usually characterized by a large bolus of fecal material that lodges in the end of the bowel and the patient has more or less difficulty in getting it to pass. After this is eliminated the remainder of the stool is very often of normal consistency and size. It is not good therapy to do anything more than is absolutely necessary to obtain this result, thus avoiding the upsetting of the rhythm of the lower intestinal tract. Cecal stasis is ordinarily labeled by the patient himself as a bilious attack and often they get very much relief by taking some calomel and a saline. I think the patient may get a good deal of relief from high irrigations in such a condition.

We are all well aware that the content

of the colon in this area is always liquid and it is generally recognized by physiologists that there is more free absorption taking place from this part of the colon than in the distal colon. This probably answers the question why the patient has a dull headache, a feeling of lassitude and really feels ill until this condition has been corrected.

There is another type known as spastic constipation which is probably wholly nervous in origin. I believe that these patients always feel better if they can have a warm or hot enema which has a tendency to relax the descending colon and sigmoid area. In atonic colon states, when the muscle tone has been lost or impaired, there is certainly no doubt about the value of this type of colon therapy.

In ulcerative colitis, or colitis gravis, which of late has been described as Bagen's syndrome, one is dealing with a fairly localized infectious ulcerative disease of the colon, which infection is secondary according to some authorities, to one somewhere else in the body, which might be thought of in terms of a widespread metastasis occurring in malignant disease.

I think the chronic ulcerative colitis of Bagen is a local evidence of a systemic infection carried from somewhere else by the lymph and venous blood stream.

These early lesions exist as infectious thrombi of minute blood capillaries. In the secondary stage these coalesce as early primary multiple petechial lesions, and in the third state systemic-borne infection of these areas occurs and ulcer production follows. These foci may be far distant, as in the head, biliary tract, and possibly in the bowel itself. I would therefore consider that colon irrigations, whether medicinal or plain, are not often indicated in this disorder. When one stops to think that the ulcerated lesions do not only involve mucous membrane but the submucosa and frequently the deep muscle layers, one could hardly suppose that the deep infection could be greatly influenced by this therapy. I would only advise it for cleansing purposes, not very frequently. In my opinion the important steps in the treatment of this disorder are the removal of the focal infection, medicinal treatments, such as vaccines and the like.

In regard to amebic dysentery which may go on to ulceration if not arrested very early, in view of the fact that we have rather specific remedies for this disorder, I would hesitate to encourage the patient that a great deal might be accomplished with enemas.

I desire to mention very briefly mucous colitis. This is a malady about the character of which there is much difference of opinion and about the etiology of which there is no agreement. We can therefore say that it is a chronic condition in which the bowel forms abnormal mucous in large quantities. In my opinion colon

irrigations are indicated in this condition for the purpose of washing out the old dead mucous that may reach as far back as the cecum and often comes away in large masses. The thick, tenacious mucous may require much soaking before it can be liberated from the mucous membrane to which it clings so tightly.

The value of arranging a definite program and getting the confidence and co-operation of the patient before treatment is begun cannot be overestimated. If one knows the indications for treatment and can get the co-operation of the patient, certainly many of the failures should be avoided.

Dr. K. E. Martin (Cincinnati): I would like to ask Dr. Wiltzie if there is any proof that toxic substances pass through the bowel wall into the circulation, and just what is autointoxication?

Dr. B. Billman (Cincinnati): I would like to ask Dr. Wiltzie if he has ever had experiences such as I have had of treating a patient say for a month and obtaining about 10 per cent improvement and then have the patient improve the remaining 90 per cent spontaneously, without further treatment at the end of another month?

Dr. J. W. Wiltzie (closing): I wish to thank Dr. Heald and the others for their discussion. There is nothing to reply to Dr. Heald as I agree with him on all points. I will answer Dr. Martin that there is ample proof that toxic substances pass through the bowel wall and are taken up by the blood stream and the lymphatics. I refer Dr. Martin to my article "Colonic Lacage in Treatment of Disease," appearing in the ARCHIVES, March, 1936, pp. 154-161. The term autointoxication is somewhat outmoded and indefinite. As Dr. Dorst has already said this morning, we prefer to speak of the intestinal symptom complex embracing bacterial hypersensitivity, colonic irritability, spasticity and stasis with reflexes and resulting toxic symptoms as the colon syndrome, or we might speak of it as the intestinal toxemia syndrome, or the chronic focal infection syndrome. The scope of symptoms and the variety of conditions embraced are too numerous to be covered by any single term.

In answer to Dr. Billman I will say the experience he has related is really quite common. After the bowel has been thoroughly cleansed, freed from infection and normal function re-established it frequently requires a few weeks more for obscure and diffuse foci throughout the body and the mesenteric lymphatic system to drain themselves free of infection and toxic substances. Unfortunately a few patients become discouraged and impatient and go to some other physician who is apt to ridicule this therapy and prescribe some simple placebo. When, therefore the patient shows his final improvement, the credit goes to the wrong man.

CLINICAL EXAMINATION OF THE LABYRINTHINE REFLEX BY THE GALVANIC FALLING REACTION *

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The galvanic falling reaction is a test devised to determine the integrity of the vestibular arc by noting the presence or absence of body deviation during galvanic stimulation of the mastoid. In 1803, Augustine¹ recorded that galvanic stimulation of the ear will produce falling. Ritter,² in 1803, also worked with galvanic stimulation of the ear. Hitzig,³ in 1871, noted that on closure of the galvanic circuit with electrodes on the ears, patients fell toward the anode, while on opening the circuit the reverse occurred. Early investigators believed that the galvanic current stimulated some portion of the brain, principally the cerebellum. Breuer,⁴ in 1874, was the first to demonstrate that the labyrinthine system was responsible for the reactions produced by galvanic stimulation of the ear. He worked with pigeons and devised a galvanic stimulating apparatus, one through the cerebellum, and the other through the labyrinth. On closure of the galvanic current, only the labyrinthine circuit gave the typical reactions. Breuer's work has been confirmed by other investigators.⁵ Loyal Davis and I⁶ also confirmed his results recently in cats. We cut the eighth nerves intracranially at the exit of the internal meatus and noted no change in extensor tonus in decerebrated cats on galvanic stimulation of the auditory bulb, as compared with the changes in muscle tone in decerebrated cats with the eighth nerves intact. Ewald⁷ was the first to demonstrate that if a small amount of current was used, spread reactions could be avoided and the stimulation localized to the peripheral mechanism. Loyal Davis and I⁶ also confirmed Ewald's work recently. The contradictory clinical results obtained by galvanic stimulation of the labyrinth has caused its infrequent application, and observations of the galvanic falling have been submerged by the large number of clinical reports on galvanic nystagmus. In testing for galvanic falling some investigators had a patient stand upright with the feet together or the heel of one foot in front of the toe of the other. Mygind⁸ used the sitting position. Wodak and Fisher⁹ had their patients stand upright with their feet together, arms horizontally forward and eyes closed. The inconsistent results obtained in the clinical application of the galvanic falling reactions, have been due to (1) voluntary interference by the patient, (2) current of large amounts producing spread reactions, and (3) pain, which, besides being disagreeable, produced additional movements to those induced by vestibular stimulation. To be of diagnostic value, a postural reflex induced by galvanic stimulation, must first, be constant in all given conditions of the vestibular system; secondly, be performed with a small amount of current to avoid pain; and thirdly, the patient cannot voluntarily mask. To meet these requirements, a balance board was devised on which the test was conducted.

Method of Testing

The patient was placed in the normal standing position on the platform, 16 inches wide, 21 inches long and $\frac{3}{4}$ of an inch thick under which is a fulcrum $3\frac{1}{2}$ inches wide and $15\frac{1}{8}$ inches in height. This balance board was arranged with the fulcrum sufficiently wide so that the patient could maintain his balance without effort, when the current was open. The moment there was a change in muscle tone produced by the galvanic current, the patient, standing on the delicately

* Read at the Sixteenth Annual Session of the American Congress of Physical Therapy, Cincinnati, Ohio, September 21, 1937.

balanced board, could not voluntarily correct his displacement of the center of gravity, and reacted by falling to one side. There is a short latent period between the closure of the circuit and the falling, which is not violent. Circular moist cloth covered electrodes are used, one over the mastoid, and the other on the upper portion of the sternum, permitting unilateral stimulation of the ear. As the auricles become painful to the galvanic current, they must not be touched by the electrodes.

Results of Study

Two hundred and thirty-seven patients, one hundred and twenty of whom were normals, were tested for the galvanic falling reaction with the use of a balance board. Closure of the galvanic circuit through the labyrinth with usually from 1 to 2 milliamperes, rarely as much as 5 milliamperes of current, resulted in lowering of the platform toward the anodal side with each normal patient. There were no doubtful reactions. The falling obtained was present without visible nystagmus (convex lenses were not used), when the eyes were permitted to be open for this observation. Vertigo was absent or occasionally only slightly present. The patients almost uniformly described the sensation as one of being pushed or pulled over.

One hundred and seventeen pathologic subjects, patients of Doctors Lewis J. Pollock and Loyal Davis, and myself, tested for galvanic falling included: sixty-three patients with epilepsy, forty-three idiopathic, and twenty patients organic type, all active to the caloric test; six with mastoidectomies with cochlear defects, and one with a bilateral suppurative otitis media, active to rotation and caloric stimulation; fourteen patients with intra-cranial neoplasms, verified at operation by Loyal Davis, included five cerebellar astrocytomas, four with frontal-temporal lobe tumors, one with frontal lobe tumor, three with parietal lobe tumors, and one patient with a glioma involving the brain stem, and five patients with suspected intra-cranial neoplasms. All these were active to caloric stimulation. Patients with one of the following conditions, acute otitis media, otitis externa, myasthenia gravis, migraine, trigeminal neuralgia, a recovered polioencephalitis, a labyrinthine fistula, and a recently recovered serous labyrinthitis, were tested and all fell toward the anode on closure of the galvanic current with 5 milliamperes or less, usually 1 to 2 milliamperes. Patients with hypersensitive labyrinths, requiring only 5 milliamperes of current included those with the following conditions; a labyrinthine fistula, a suspected intra-cranial lesion, a verified supra-tentorial tumor and recently recovered serous labyrinthitis. One patient with a tentorial tumor producing a pressure against the vestibular nerve required 8 milliamperes, but was inactive to caloric stimulation. One patient with a temporal meningioma failed to react to caloric stimulation on the involved side, but fell toward the anode with 5 milliamperes of current. The remaining 16 pathologic subjects had inactive reactions to the usual labyrinthine tests, and included two patients with chronic suppurative otitis media with cochlear deafness, three patients with old basilar skull fractures, one patient with Menière's syndrome, one with a post operative cerebello-pontile angle tumor, six with cochlear deafness which followed an infectious disease or whose cause was unknown, two with acoustic neurinoma and one patient with a temporal lobe tumor on the side opposite to the dead labyrinth. They failed to react to stimulation of the involved ear with current from 10 to 15 milliamperes. In the tumor group patients with supra-tentorial neoplasms required less current to produce the galvanic falling reaction than those with infra-tentorial lesions, in spite of the fact that the latter group of patients was ataxic.

The results obtained in normal and pathologic subjects indicate that the galvanic falling reaction applied as described, is a reliable method for testing

labyrinthine function. This method of examination has the advantage over other labyrinthine tests in that it causes the patient no discomfort and can be repeated frequently in the same individual. The galvanic test applied to observe nystagmus could not be verified consistently and reliably by all observers, whereas the galvanic falling test applied with the balance board is a galvanic test which has given us constant results, and which I feel will prove as reliable as the caloric and rotation method tests in the hands of all who wish to use this method.

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Discussion

Dr. Noah Fabricant (Chicago): Doctor Blonder has done a good piece of work in giving this refinement of technic for performing the falling reaction following the galvanic stimulation of the vestibular apparatus. The method of having the patient stand on the balance board while the test is done certainly makes the reaction easier to detect, and probably requires less current, as he states. To say, however, as the essayist does, that this test "has the advantage over other labyrinthian tests in that it causes the patient no discomfort and can be repeated frequently in the same individual" is somewhat misleading in that it gives the impression that this test replaces the other means of labyrinthian stimulation. This, in my opinion, is not true, particularly in respect to the caloric test. This is the acknowledged method for studying the function of the labyrinth, qualitatively and quantitatively. It can also be employed in the vast majority of cases without discomfort and with great exactness, especially when the Frenzel glasses are used.

Anyone who has had the experience in eliciting galvanic nystagmus, employing the Frenzel glasses, cannot help but disagree with the essayist, that as an objec-

tive phenomenon which is entirely independent of subjective influences, it is at least the equal, from a diagnostic standpoint, to the falling reaction. Finally, the essayist gives results obtained by testing a wide variety of conditions involving the ear and central nervous system in which an attempt is made to establish a criterion on the basis of the amount of current used. It has been the experience of observers, such as MacKenzie and Vogel, that the value of quantitative measurements in large series of subjects, lay in differences of two milliamperes or more between the two ears, rather than in any constant amount of current which could be considered as normal, as is implied in the paper. While the observations of these and other men were obtained by watching the nystagmic response, there is no reason to suppose that the falling reaction, which is essentially also a vestibular reflex, would behave any differently when resulting from galvanic stimulation. In conclusion, I wish to state that in spite of these differences, Doctor Blonder's refinements of technic for performing the falling reaction following the galvanic stimulation of the vestibular apparatus is an excellent contribution to otology.

FULGURATION OF CONTACT ULCERS OF THE VOCAL CORDS *

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In the field of laryngology, pathologic conditions of the vocal cords present some interesting diagnostic problems. In differentiating between lesions of the larynx, we consider benign and malignant tumors, syphilis, tuberculosis and acute and chronic laryngitis. Since 1928 Chevalier Jackson has called our attention to another laryngeal disease, contact ulcer, occurring on the plica vocalis where the vocal processes come together. This condition is not as uncommon as the literature would lead one to believe.

Contact ulcer of the vocal cord is caused by the breaking down of the epithelium on one or both cords at the vocal processes where traumatic injury is most likely to take place. The lesion may be a superficial, soft tissue slough, or an extensive ulceration involving the cartilaginous tip of the vocal process. The healing of the perichondritis and infected vocal process is very slow, and is generally retarded by exuberant, unhealthy granulations which must be removed in one way or another. It is in this group of cases that I have used fulguration and electrocoagulation with excellent results.

Case Reports

The first case I would like to report is that of H. W. H., male, age 40. On December 10, 1936, he gave a history of a severe head cold during the last two weeks of November. On the evening of December 5th, he took a small glass of a well known cereal drink, hoping to get a better night's sleep, but thirty minutes later suffered such a severe and violent allergic reaction that he thought he was going to die. He described the allergic reaction as big white blisters appearing especially on the arms and legs. His scalp itched and he choked and coughed in such a convulsive manner that he could hardly get his breath. The next several days his voice would catch and break and any continued vocal effort would bring on severe paroxysms of coughing.

On my first examination, December 10, 1936, the laryngeal mirror picture was one of a hive or blister opposite the vocal process of the right plica vocalis. The lesion had ruptured with little or no tissue reaction following. There seemed to be an epithelial pocket that may have contained serum but no granulation tissue or infection was noted.

Five days later, after a complete physical examination which ruled out syphilis and tuberculosis, or any systemic disease other than allergic reaction to pollens and some foods, he was placed on silence. The laryngeal area was sprayed with three per cent menthol in albolene, following daily irrigation of the throat with hot soda water and application of five per cent mercurochrome to the ulcer. During the next two weeks I was interested to note the increase in vascular supply to the ulcerated area and the beginning formation of exuberant granulation tissue.

On December 31, 1936, I used fulguration to the early granuloma and repeated this procedure on January 20, 1937. This treatment was followed by rapid epithelial and connective tissue healing.

On February 10, 1937, the patient was again allowed to talk and has had a clear voice since that time. This patient was so remarkable in his silence during this seven and one-half weeks period, that a waitress in a restaurant thought he must be deaf and dumb. I believe that this strict silence avoided involvement of the other cord. It is very possible that the patient would not have developed this contact ulcer if the urticarial hive had not ruptured during the choking and coughing convulsive seizures.

The second patient was E. W. G., female, age 65, who had complained of a sensi-

* Read at the Sixteenth Annual Session of the American Congress of Physical Therapy, Cincinnati, Ohio, September 22, 1937.

tive throat for years, but in May, 1936, began to cough and run a daily elevation of temperature, 101 to 102 degrees, which lasted three weeks. When this patient was referred to our office on September 1, 1936, the only symptoms were hoarseness and a slight but irritating cough. Chest x-rays, sputum examination, Wassermann and a direct smear from the laryngeal lesion for fusiform bacillus, were all negative. The laryngeal examination revealed a typical contact ulcer of the left plica vocalis, with a large amount of exuberant, unhealthy granulation tissue, which was causing some beginning change of the right plica vocalis immediately opposite the original lesion.

Electrocoagulation was applied to the granuloma and the patient advised to rest the voice. While the lesion was improved one month later, another fulguration was given the remaining granulation.

The third patient, L. D. G., male, age 58, on July 13, 1937, complained of voice huskiness which had continued for five months. As he was a conductor on a railroad, it was necessary for him to abuse his voice at times, a fact which very likely explains the etiology in this case.

The laryngeal examination revealed a lesion on the left cord, with a granuloma of considerable size, preventing the glottis from closing.

Electrocoagulation was applied to the granuloma on July 13, 1937, and repeated on August 14, 1937, with good results.

Pathology

The mucous membrane of the glottis varies in structure from a stratified, ciliated columnar type in the posterior interarytenoid fold, to a stratified squamous on the anterior two-thirds of the plica vocalis. This transition occurs at the vocal processes which are immediately sub-epithelial, causing, undoubtedly, considerable trauma to this transitional squamo-columnar epithelium on abuse of the voice.

It is very seldom that we see a case of contact ulcer of the vocal cord in the early stage. In my report of the first case, the pathologic process presented on the fifth day after onset, was no more than a ruptured hive, with little or no tissue reaction or infection. As the low-grade infection invades the traumatized epithelium, however, fibrin, new blood vessels and a monocytic infiltration begins. Following this low-grade inflammatory reaction, fibroblasts are called out. By destroying the superficial infected granulation tissue with fulguration, fibroblastic activity is stimulated and healing by scar formation and epithelialization takes place. The cartilaginous tip of the vocal process does not seem to be damaged by fulguration and the infection is definitely reduced to a minimum. It is my opinion that surgical removal of this infected granulation tissue may open up the base of the area to new infection, causing prolonged healing.

Technic of Treatment

Application with laryngeal applicator of two per cent pontocaine solution to the larynx and pharynx, gives sufficient local anesthesia for indirect laryngoscopy and treatment. Fulguration or electrocoagulation is applied with a curved, hard-rubber covered needle electrode, directed into position with a laryngeal mirror. In most cases only two or three fulgurations at three to four week intervals will be found necessary.

Summary

1. Contact ulcer of the vocal cord is generally caused by trauma of transitional mucous membrane over the vocal processes, due to abuse of the voice.
2. Fulguration of low-grade infectious granulations of contact ulcers definitely hastens recovery.
3. Indirect laryngeal fulguration is easier on the patient than the direct method, and just as effective.

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Discussions

Dr. A. J. Cone (St. Louis): There are several questions I would like to ask Dr. Howard. The first question is whether a disturbing edema in the larynx follows the fulguration. This would appear likely especially in the first case where there was terrific paroxysms and respiratory difficulty. The second question: Was there ever any fear that there might be an early malignancy in the cases treated.

I think the essayist has described an effective method of dealing with contact ulcer. The superiority of electrosurgery over chemical cauterization seems quite obvious.

Dr. R. E. Howard (closing): In regard to edema little or none follows electrocoagulation applied to lesions of the vocal cords. At least this is true when the application is direct.

The patient that I mentioned first in my article is here today, Mr. Mans, and he

can probably tell you whether he had disturbing edema following the treatment.

Mr. Mans: You will have to tell me what edema is.

Dr. R. E. Howard: Swelling and choking and difficulty in breathing following the treatment.

Mr. Mans: No.

Dr. R. E. Howard: The second point you brought up in regard to the possibility of malignancy, or in this case, tuberculosis. Those are always disturbing factors, and close observation of the patient is necessary to rule out malignancy without biopsy. And if the tissue bleeds readily on touching it, then I think biopsy is always best before the use of fulguration.

We very seldom see laryngeal tuberculosis without some affection in the chest which is always checked over before we do anything to the larynx.

BIOLOGIC ACTION OF X-RAYS AND RADIOSENSITIVITY *

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Much has been written and discussed on the mechanism of the effect of x-rays or the gamma rays of radium on living tissues. Among the various attempts to explain the radiotherapeutic phenomenon I mention the opinion maintained by Dessauer,¹ that the biologic action of the roentgen rays takes place by reactions of a thermic nature, localized at certain points, which he has designated "points of heat." Holthusen, cited by A. Solomon in his book, regards the biologic action of x-rays as photochemical in nature.

The authors who have studied this question do not appear to have known or taken cognizance of the theory published in the report, which I was directed to edit on the occasion of the Fourth International Congress of Physical Therapy held in Berlin, in March 1913, entitled: "Biochemic Action of Radiations, Especially of the Roentgen Rays."

Radiosensitivity of Chromatine

In spite of the ideas set forth in the lengthy report, the question of the mechanism of the action of radiations has not yet been fully elucidated. Thus one reads in the authoritative work of Regaud and Lacassagne² that "our ignorance concerning the causes of radiosensitivity is still great." In this book one finds also the statement:

One may ask whether the variable radiosensitivity of the cells does not present to the physico-chemical modalities elements they contain, particularly chromatine, and whether the modifications undergone by this element are not the cause of lessened resistance of the cells, which would explain their elective susceptibility to x-radiations.

As early as in 1903, Böhn maintained that in the cell it is the nucleus, and in the nucleus it is the chromatine which is the substance sensitive to radiations. Accordingly one is justified in conceding that very probably the x-rays take effect on the chromatine proper. But by what mechanism? It is this which I shall place in evidence, as I have already endeavored to do in 1913.

Absence of Chemical Action. — Before presenting the theories to facilitate understanding how and why the x-rays function, I point out that these rays do not produce chemical actions in the commonly accepted sense. Thus if a freshly prepared solution of silver chloride is placed in darkness in a container of wood or cardboard and exposed to a large dose of x-rays it will not be affected, while on the other hand light or ultraviolet will rapidly cause a reduction of the silver salt. The same holds good also for paper treated with citrate of silver.

The action of the x-rays on the photographic plates of gelatine-bromide silver used in radiography seems to contradict what has just been stated. It is necessary to point out that here we do not deal with a phenomenon comparable to the one resulting from the action of light or ultraviolet, which reduces the silver salt. As I have long since shown in my lectures on biophysics, it is the particular colloidal state of the silver bromide in the gelatine that is the cause of the action of the x-rays. It is generally known that sensitive photographic plates are manufactured by means of a solution of gelatine into which is incorporated the silver bromide by double decomposition of ammonium bromide and

* Translated from the French original.

silver nitrate, after which the emulsion is heated to 35 or 40 C. for seven to eight days, when it is subjected to a temperature of 100 C. only for half of one hour.

The ionization produced by the rays destroys the electrically charged ultra-microscopic particles more or less completely, depending on the quantity of the rays that has been absorbed. There results a flocculation of the colloidal granules whose charge has disappeared. These flocculated granules at the moment of the development of the plate behave differently from those which remained in the colloidal state — they produce the radiographic image.

Another example at first also appears to contradict the absence of chemical action of the x-rays, and that is the intensification of barium platino-cyanide under the influence of the rays. It is known that this salt when subjected to increasing doses of the rays changes color from fluorescent apple-green to a shade of chestnut-yellow, while at the same time the fluorescence diminishes progressively.* In this reaction one finds the principle of my chromoradiometer.³ But here we have no purely chemical phenomenon, for the same intensification of this salt is obtained by percussion. It is therefore to molecular dissociation produced by the x-rays that one should attribute the change of color of the salt, and not to a chemical action.

It should be recalled that Villard has demonstrated that light produces on platinum cyanide an effect opposite to that of the x-rays. The x-rays produce no change in blood taken from the body. After having applied intense doses, I have shown the absence of any changes in the hemoglobin, while with ultraviolet radiation hemoglobin is changed into methemoglobin.⁴

By studies with the collaboration of Galimard⁵ of biochemic reactions and artificial digestion, I have determined that the action of strong doses of x-rays is absolutely nil, either before or during digestion with fibrin, pepsin and albumin. We have also found that the rotatory power of saccharose has not in the least been influenced by subjection to enormous doses of x-rays.

Bergonié and Tribondeau⁶ observed that blood irradiated in vitro undergoes no change at the beginning of hemolysis, the characteristics remaining identically the same as those of blood that has not been subjected to radiation.

Absence of Effect on Cells Removed from the Organism. — In a general way one can say that the x-rays are incapable of producing a marked action on cells or tissues removed from the organism. Thus one can observe no change or modification in spermatozoa after subjection to very strong doses of x-rays (Bergonié and Tribondeau⁷). On the other hand its powerful action on living blood, the testicles or the elements of sexual procreation of subjects exposed to roentgen irradiations is today well known.

Phenomena of Ionization. — According to our conception the action of radiations on the cells of living tissues concerns mainly the particular state of the cellular albuminoids. To this must be added the well known ability of the x-rays of producing ionization and molecular dissociation. Ionization is observed not only in solid and liquid bodies but also in gases. Absorbed by the latter, the x-rays produce a gaseous molecular dissociation and gaseous ions. So far as concerns the phenomena of ionization leading to flocculation of particles in colloidal suspension, I believe to have been the first who, in collaboration with Galimard, in 1905, demonstrated them on a pseudo-solution of Michaelis or phosphorus suboxide.* When this is placed in a container covered by aluminum

* One will peruse with interest the experimental study I have made in collaboration with Galimard, published in the "Archives d'Electricité Médicale" in 1905 (p. 323 and p. 611).

* This oxide is easily obtained in a colloidal state by having light act on an ethereal solution of white phosphorus. This originally limpid solution assumes a yellowish color. By filtration one does not obtain a clear fluid, as the phosphorus oxide remains in colloidal suspension.

or cardboard and subjected to the action of x-rays, the pseudo-solution, which is originally turbid, clears up and yields a reddish deposit which is insoluble in a mixture of water and alcohol. Here one recognizes the presence of phosphoric acid. The flocculation of phosphorus suboxide and its precipitation at the bottom of the container by the x-rays are the result of ionization of the irradiated medium, evoking loss of the electrical charges which carried the ultramicroscopic particles of colloidal oxide of phosphorus. We have succeeded in obtaining the identical reaction in a greatly diluted colloidal solution of starch. When this solution is subjected to a strong dose of x-rays the originally turbid liquid becomes limpid while the starch granules are precipitated at the bottom of the container.

As is known, the cellular albuminoids of the body are of the same state as the colloids, and possess electrical positive charges, as is shown by the passage of a direct current freeing the colloidal granules at the negative pole.

Flocculation and Loss of Electrical Charges. — The explanation which I submit about the mechanism of the action of x-rays, rests upon the flocculation of ultramicroscopic particles following ionization produced by the rays in the living cells. Under the influence of roentgen radiation the colloidal granules are partly or totally deprived of their electrical charges and their colloidal state ceases in the following manner. The ultramicroscopic particles which previously were in suspension and constant agitation in each cell, lose their physiologic property and become incapable of insuring the nutrition of the affected cells.

Experiments With Young Crystalline Lens Substance. — Flocculation of granules of albumin can be obtained experimentally in the crystalline lens of a new-born animal in which the albuminoid substance is of recent formation, because before the eye lids are opened the crystalline substance is very liquid. Tribondeau and Belley⁸ have irradiated under these conditions the eye of a new-born cat, and found some time later not only a diminution of the eye ball as compared with the non-irradiated eye, but also the existence of a cataract. This is a very important observation, for it shows that the x-rays have the power to flocculate the crystalline granules of albumin to an extent of causing opacity of the lens — cataract. The x-rays do not produce the same action on an old lens. Tribondeau and Belley have shown that while in the new-born cat even feeble doses of x-rays produce cataract, the radiosensitivity of the lens diminishes as it ages, and that it takes place rapidly during the first month after birth.

Causes of Radiosensitivity

The experimental data just presented prove that the x-rays can induce flocculation in young, living albuminoid substances, and that this radiosensitivity diminishes as the albuminoid substance becomes older. One can therefore formulate this concept: *Radiosensitivity of living cellular albumin is most pronounced when the colloidal granules belong to a young generation of cells, the electrical charges of the ultramicroscopic particles being weaker than in older cells.* If this premise is accepted, the action of the x-rays on living tissue, normal or new-formed, is easily understood as a cytolytic effect resulting from the radiosensitivity of a cell, which is the more certain the younger the generation to which it belongs.

There are many examples of this great sensitivity. Regaud and Lacassagne studying the action of the x-rays on the ovary of rabbits stated that "the radiosensitivity of the ovarian follicles varies according to their stage during the irradiation." These authors have also recognized that "liquefaction of the debris of the ovocyte is the more rapid, the younger the follicle of which it is a part." However, irradiation of the thymus of a cat carried out by these authors re-

vealed that the thymocytes do not have the same radiosensitivity, for their resistance grows with their age.

Electivity of X-Ray Action. — The data I have submitted facilitate understanding of the mechanism not only of the action of the x-rays by flocculation of colloidal granules of albumin, but also of the elective action of these same rays. If, as may be assumed, the cells of recent formation, normal or pathologic ones, are the most radiosensitive, this is due, according to the above-stated conceptions, to the circumstance that flocculation of the ultramicroscopic granules of albumin is easier to obtain in young cells. This more rapid flocculation is explainable by the ionization produced by the rays in the irradiated cells and consequently by the more rapid discharge of the colloidal granules of cellular albumin.

Electivity of roentgen action therefore is explained by the greater radiosensitivity of cells of recent formation where reproductive activity is constant. So far as concerns normal cells, one may cite those of spermatic reproduction, the formative elements of hairs and the like, and newly formed cancerous or sarcomatous cells. A sufficiently penetrating radiation therefore will prove lethal for these cells, while the others will remain almost untouched. It is on this fact that all radiotherapeutic applications are based.

Fate of Flocculated Cells. — Let us see from a histologic point of view what becomes of the cells which have been most affected by virtue of their greater radiosensitivity. According to Regaud and Lacassagne "a cytolytic process starts by greater density of the chromatine of the nucleus which soon undergoes fragmentation and whose debris disseminate in the cytoplasm in the form of small globules of variable dimensions. The cellular body, originally granular, undergoes as a result a sort of liquefaction which in turn sets free the chromatinic debris representing the last trace of the cell." It should be recalled that the chromatine of the nucleus is essentially an albuminoid substance.

Phenomena of Reaction. — There remains to be seen whether the explanation I have given of the action of the x-rays on living cells on the basis of ionization produced by these rays which modify the partial or total loss of the small electrical charges carried by the colloidal granules of albumin, is in accord with the observed facts. It also remains to be established whether this explanation enables us to understand both the reactions produced by feeble and those by strong doses of the rays, apart from that which is called the period of latency, which is the interval between the moment of irradiation and that of the appearance of visible reactions in the irradiated tissues.

It is logical to accept that the degree of flocculation of the ultramicroscopic granules in each cell should correspond with the intensity of the ionization. Slight flocculation will correspondingly exert a weak influence on the life of each cell subjected to radiation. The disturbance in the cell will practically (not histologically, as will be seen later) manifest itself by a poorly perceptible reaction. With a stronger dose, ionization will be more pronounced, and the number of flocculated granules in each radiosensitive cell will be larger than in the case just considered. Accordingly there should become evident a retarded vitality, the consequences of which will appear several weeks after irradiation, but the cells whose chromatine has sustained the effects of the x-rays do not die and their regeneration takes place, thereby ameliorating the noxious effect of the radiation.

If, finally, the dose is strong or very strong, the ionization may produce in each cell precipitation of the largest quantity of the albumin, and there will remain only a quantity of ultramicroscopic particles insufficient to enable the cell to live for some time before its death.

Explanation of Period of Latency. — This explanation of radiosensitivity on one, and the action of the x-rays on the other hand seems to be in accord with

the observed facts. But there is something more. It provides an account of the existence of a latent period mentioned above, which, I repeat, is the delay of a lesion produced by the x-rays manifesting itself macroscopically, that is by signs visible without the aid of a microscope. For example, after radiation of a region covered by hair with a therapeutic dose, about 15 days elapse before one can see falling of the hair. Similarly after radiation of a testicle, disappearance of the spermatozoa is not seen until after 25 to 30 days.

It is important to know that this period of latency does not exist when one examines the radiated cells with the microscope. In other words, as Regaud and Lacassagne stated: "there is no histologic latency, study with the microscope enabling us to note from the first hours after radiation destructive lesions of the specially sensitive cells."

Difference in Effects Produced By One Dose. — The conceptions which I have presented enable us finally to understand the difference between consecutive reactive effects by one massive dose, and one applied in several sessions, separated by an intervals of several days. By applying each time a dose of 1000 r, for example, and by observing the technical rules and making use of an aluminum filter of one millimeter, this dose renewed every 15 days and carried out six times, will not be followed by a cutaneous reaction, not even by an erythema, while the same dose of 6000 r applied at one time under the same technical conditions will be followed by radiodermatitis.

This difference in effects is easily explained if one accepts the proposed theory, namely, that in fractional dosage flocculation of the granules of cellular albumin is feeble in each irradiated cell, that there is only a small number of precipitated colloidal granules, so that cellular life affected by radiation is changed but little. In the interval of the radiotherapeutic sessions each affected cell repairs the loss of colloidal granules, whose electrical charges have more or less disappeared as a result of ionization, so well that such a cell will be before the next treatment in a state little changed from that of one that has not absorbed the x-rays.

On the other hand, when a dosage of 6000 r is administered at one time, the cytoplasm will be blocked by flocculated colloidal granules of albumin, with the chromatinic debris representing the last trace of the cell. The life of each cell under these conditions will become impossible once the period of latency has terminated, and radiodermatitis will be in evidence.

Comment

The principal elements of the theory I have propounded have been outlined and described in my report to the Fourth Congress of Physiotherapy at Berlin, in March, 1913, and also in the *Archives d'Electricité Médicale* of April 10, 1913, page 289 *et sequ.*

Some authors have taken up and republished these conceptions, some without having mentioned my labors which preceded theirs, while others on the other hand have reported the essential points.

Among the authors of the first category is Auguste Lumiere. In a book entitled "Role of the Colloids in Living Beings" (in French), which appeared in 1922, he writes on page 105:

We can explain the mode of action of the radiations under consideration by the property which they possess of causing the positive colloids to flocculate. . . . One can therefore assume that if the radiations are capable of killing certain cells, they cause their protoplasm to flocculate.

One finds here reproduced the principal element of explanation which I have advanced 15 years earlier. Likewise, a thesis submitted in 1937 to the faculty of medicine of Lyon by George Cluzet closes a chapter under the title "Mechanism of the Physico-chemical Effects of Irradiation," of which I will abstract only the following two passages. On page 67 one reads:

It is due to a modification of electrical charges that one must ascribe the cause of the variations of the physico-chemical properties of irradiated protein matter. These modifications of superficial electrical charges may lead to flocculation of the substance. . . . This idea of the dose required for the production of flocculation is particularly curious and facilitated boldly perhaps, to visualize the mechanism of radiotherapy by flocculation of cellular albumin.

As is seen, these publications make no mention of either my experiments or conceptions published 25 years ago!

In contrast to these two authors, Mazères has not only mentioned my labors, but has critically reviewed them. I cite from his publication the following sentences:

Experiments with colloids have enabled Bordier to establish a biochemical theory on the action of the x-rays. He accepts (1) that the x-rays do not produce chemical effects, but physico-chemically cause molecular dissociation and ionization; (2) that the rays precipitate positively charged colloidal albuminoids; (3) that if the precipitation is feeble, there is regeneration and excitation (law of weak dosage); (4) that if precipitation is pronounced, the cell can live only on its remaining albuminoid reserve, after whose exhaustion (time of latency of reaction) the cell degenerates and dies (law of strong dosage); and (5) that young colloids are more unstable, which explains radiosensitivity and the law of Bergonié and Tribondeau.

This author concludes thus:

Bordier's theory enables understanding of all laws concerning hypersensitivity of young cells and of newly formed cells, the existence of a phase of latency, the difference between weak and strong dosage, and the difference in the action of quality.

It is regrettable that the other authors mentioned above have not taken into account, as has Dr. Mazères, the conceptions which I have published since 1913 either in the *Archives d'Electricité Médicale* or in my report to the Berlin Congress.

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ARCHIVES of PHYSICAL THERAPY

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∴ EDITORIALS ∴

PSYCHIC FACTORS IN PHYSICAL THERAPY

The charge heard in certain quarters that physicians employing physical measures in the treatment of diseases fail to appreciate the role of psychic effects is not devoid of some justification. This, however, should not be construed as an admission that physical therapists are remiss in doing their full duty to their clientele. Why precisely this class of practitioners and not internists and surgeons have been the subjects of reproach, is to say the least rather problematic.

There prevails a certain psychologic aspect in every relation between physician and patient, and in this particular regard it matters little if at all what particular specialty one pursues or which special method of therapy one employs. One may even step beyond the field of scientific medicine and assert that an identical relation necessarily exists between virtually every sick individual and any person claiming to have some knowledge of the nature of human ills and their remedial management.

Such a relation can be formulated in terms of personality on the part of the physician and confidence on the part of the patient. The Romans, to mention only one people, had a keen realization of it, as is evidenced by their adage, that the beard of the physician wins half the battle with disease. That of course implied personality of the healer and, as a corollary, confidence by the ill and halt. If we exclude the skeptics and unemotional individuals with whom medical men occasionally come in contact, we may compare the relation between physician and patient as that of ruler and subject, at least until this relation is dissolved by loss of confidence in the authority (ability) of a given ruler (healer).

More than one great medical teacher has impressed upon his potential followers in the profession that in the actual practice of medicine the physician who does not possess the unshakable confidence of a patient would do better to refuse him or her his services. But after all has been said and done, physical therapists more than any other group of practitioners have less reason to stress the psychic factor in their management of diseases than is contained in the above mentioned charge placed against them. To be sure the holding out of hope that a given sufferer will in the not too distant future obtain surcease buoys the patient's flagging spirit, but this is no more than would result from any one bringing cheer into an atmosphere of sorrow or depression. But in the last analysis such a pledge or hope must be fulfilled, else neither the personality of the physician nor his efforts at influencing the patient's psyche will prevail.

Physical therapy is a branch of medicine more concrete in its effects than pharmacotherapy, for in the latter often a placebo may accomplish the desired result, either because *vis medicatrix naturae*, the natural course of a disease process, or perhaps the psychic effect have played a role in terminating the undesirable phenomena. To draw a conclusion of effectiveness in similar instances means simply falling into the error of post hoc reasoning. Just as in surgery and mechanical orthopedics so in physical therapy one most often has to deal with palpable, organic deviations from the normal whose *restitutio ad integrum* is not a matter of the patient's mind but of histologic regeneration. And here cause and effect are explainable by simple but concrete factors which have only the remotest relation to psychotherapy.

Menninger's contribution that appears elsewhere in this issue is valuable because it brings to light problems which in the past have perhaps inadequately aroused the interest of physical therapists, but at the same time it should not be overlooked that his view point is that of the neuro-psychiatrist who has to deal with tangible as well as intangible phenomena of disease. If physical therapy is resorted to by neuro-psychiatrists because certain patients find in its measures an outlet or relief from their emotions there cannot be the least objection, but it would be illogical to draw from such successes the conclusion that physical measures have a distinct influence on disturbances through psychotherapy. Inflammation, infection, algias, atrophy, loss of tissue, vascular disturbances and all the rest of the ills for which physical therapy has proved effective are lesions in the fullest sense of the word, and the good and bad results obtained by any therapy in these affections must be analytically reduced to organic terms, with the psychic factor playing a role only insofar as we as physicians are treating human beings as well as lesions.

THE CONGRESS

Physicians who will attend the 17th Annual Session in Chicago will have an opportunity to observe the progress which the Congress has made during the past seventeen years. The battle has been an up-hill one. Few now realize the early obstacles and problems with which the officers had to contend.

The Congress has grown by leaps and bounds and has established itself as one of the leading medical organizations of the country. The extensive operations of the central office in Chicago, the work of the technicians' registry, the sectional meetings and the elaborate scientific programs of the annual conventions are but a few of the functions which have been carried out to obtain for scientific physical therapy its present high position.

Those who are selected officially to carry on for the future have a difficult task. The standards set in the past have been high. It will require increased effort and energy to execute the additional labors entailed by a rapidly growing medical body whose field is relatively new, but whose value is constantly growing.

One of the outstanding features which has contributed to this development is a spirit of co-operation. This has always been manifest. The absence of political problems has given greater opportunity for scientific endeavor, a fact which becomes immediately obvious by casting a glance at the present program for the various convention sessions.

The Congress takes pride in the fact that its members are progressive. It is only natural that a progressive membership makes for a progressive organization. It is with no small measure of appreciation that we record the efforts of individual members. The fine co-operation, arduous work and sincere spirit of the officers, publication committee, and editorial staff merit the highest commendation. The loyalty and support of the office force cannot be overrated.

While the annual convention is not the beginning of a new fiscal year for the Congress, it is to most of us the end of an old period and the beginning of a new. Old acquaintances and friendships are renewed; and then—work, papers, addresses, exhibits, clinics!!

It will all be like a panorama of serious but happy endeavor, and soon the 17th Annual Convention will pass into history. But progress will be made. The Congress will set a strong precedent; the goal for the future will be farther away, but one to which we will aspire and finally reach. Progress must and will be made in the future as in the past.

VISIT THE SCIENTIFIC AND TECHNICAL EXHIBITS

While the convention committee has always endeavored to gather together an excellent display of technical equipment and scientific material, this year's presentation should be especially appealing. The exhibits no doubt will prove of especial interest to every physician and hospital executive. Several recent developments in apparatus as well as improved models of every type of equipment will be shown by manufacturers and distributors. Modern engineering genius is constantly effecting changes in physical therapy apparatus which render the older models obsolescent. The tendency to combine appearance with efficiency is also something which should not be disregarded.

The manufacturers have been most helpful in doing their part to make the 17th annual convention a success. We urge every one attending the sessions to spend some time viewing the exhibits. It is not necessary to make a purchase and there will be no solicitation. Demonstrations will be made on request.

To the scientific exhibitors the Congress likewise owes a debt of gratitude for their participation in the convention program. The subjects are so diversified that every specialist and general practitioner will find at least some of decided interest.

We suggest a systematic review of all the exhibits, technical and scientific, and strongly urge that you allot your time so that you can do justice to both.

PUBLICATION OF SEMINAR LECTURES

Announcement is made that the lectures delivered at the Instruction Seminar will be available next month in book form. The Congress has received many urgent requests for a permanent record of the course of instruction not only by those who have attended previous seminars but by physicians and technicians who were unable to attend in person. This demand has been made with the implied suggestion that the subject matter of the Seminar apart from its intrinsic scientific value will prove the means of obtaining in condensed form technical advances that are not presented in textbooks and monographs. The book will facilitate better preparation for the registry examination and prove an excellent medium for more scientific practice. The variety of subjects treated in this work and the circumstance that they are presented by outstanding authorities familiar with the needs of general practitioners and qualified technicians should assure informative value to all interested in the application of physical measures.

SCIENCE, NEWS, COMMENTS

Meeting Radiological Society of North America

The twenty-fourth annual meeting of the Radiological Society of North America will be held in Pittsburgh, Penna., November 28th to December 2nd at the Hotel William Penn.

Warning Against Infantile Paralysis Vaccination Issued

A warning to physicians of the country to stop further vaccinations of children against infantile paralysis appears in *The Journal of the American Medical Association*.

The warning may be read between the lines of a report of twelve cases of infantile paralysis, six of them fatal, following vaccination against the disease. The report is signed by Dr. J. P. Leake, Medical Director, U. S. Public Health Service, one of the country's authorities on this disease.

The twelve cases developed following the use of one or the other of two vaccines, named in the report only as vaccine A and vaccine B. Both vaccines were prepared from infantile paralysis virus treated so as to make it incapable of causing the disease, in the opinion of the scientists who made the vaccines. The cases of disease following their use were reported to the U. S. Health Service by the scientists responsible for the vaccines, by several health officers, and by others.

Twelve cases of the disease following many thousand vaccinations does not seem at first glance a large percentage. The circumstances of the cases, however, and the amount of infantile paralysis among children of the same ages in the same communities, and the number of cases normally to be expected make the twelve cases much more significant, Dr. Leake points out in his report.

"Likelihood of the whole series of cases having occurred through natural causes is extremely small," he states.

He believes that many physicians will feel that these cases make "undesirable the further use of poliomyelitis (infantile paralysis) virus for human vaccination at present."

"Although any one of these cases may have been entirely unconnected with the vaccine, the implication of the series as a whole is clear," he states.

The cases also furnish new evidence in support of the theory that the virus of infantile paralysis travels along the nerves and not in the blood or lymph streams, as most disease "germs" do. In every one of these cases where the sequence is known, the level of the spinal cord first affected corresponded to the arm or leg where the vaccine was injected. The paralysis began either in the vaccinated limb or in the corresponding one on the other side of the body. — *Science News Letter*.

New Rôle for Pituitary — It Controls the Spleen

Discovery of a new activity of the pituitary gland and possibly of a new pituitary hormone was reported by Dr. David Perla of New York City to the American Association of Pathologists and Bacteriologists.

The new hormone from the powerful but tiny gland in the head stimulates the spleen. This important organ is endowed with enormous recuperative powers, so that when a part of it must be removed because of disease, or is damaged, the organ regenerates itself, forming new spleen tissue to replace that lost. In animals the spleen cannot regenerate when the pituitary gland has been removed, Dr. Perla found. Doses of pituitary extract, however, renewed the regenerative power of the spleen in these animals whose own pituitary glands had been removed. These and similar studies indicate that the pituitary, besides influencing growth, sexual development and other body activities, also has control over the spleen. — *Science News Letter*.

Vitamin B May Play Part in Body's Fat Production

A new role for vitamin B, helping the body gain weight by building up fat, is suggested by experiments reported by Drs. Dorothy V. Whipple and Charles F. Church, of the University of Pennsylvania School of Medicine, at the meeting of the American Society of Biological Chemists.

Animals given diets that contained no fat but plenty of vitamin B were able to gain more weight than their mates on the same fat-free diet but without the vitamin. Comparing the average body composition of the animals, the Philadelphia investigators found that fat accounted for half the gain in weight made by the animals on the vitamin diet. Water accounted for the other half of the weight gain.

The figures, they reported, suggest the possibility that vitamin B plays a role in the building up of fat in the animal body.

Vitamin B is found in moderate amounts in most natural foods, but its chief sources are wholemeal cereals, yeast, peas, beans, egg yolk, nuts, liver, kidney and heart. Lack of this vitamin causes beriberi, a disease mostly found in the Orient, but which can occur anywhere if this vital food factor is omitted from the diet.

Consequently, fat persons cannot hope to lose weight by omitting vitamin B from their diet, even if the investigations reported today are confirmed and the vitamin is found actually to be important in weight-building. But thin persons wanting to gain weight may in the future be advised to add liberal amounts of the vitamin to their diet. — *Science News Letter*.

Don't Let Diabetic Child Go Hungry, Doctor Warns

A warning against under-feeding children who suffer from diabetes was sounded before the American Dietetic Association.

Dr. Henry John of Cleveland, Ohio, declared that it is no use for physicians to prescribe a low diet, insufficient to satisfy the diabetic child's hunger. So keen is the child's misery that either his mother will feed him snacks to be rid of his continuous complaining, or else the child will desperately steal food. The proper diet prescribed should be ample to satisfy hunger, the diabetes specialist emphasized.

Dr. John drew a bright picture of the diabetic child's fate today, in contrast to the grim course of the disease in days before insulin was discovered. Before insulin, the diabetic child starved to death, crying for the food that could not be increased for fear of hastening the end.

Insulin, which has given diabetic children not merely existence but active and happy life, was pronounced by Dr. John "one of the most triumphant and thrilling stories in all the history of medicine."

No longer a living skeleton, the diabetic child today is likely to be indistinguishable from non-diabetic youngsters. In fact, those who receive properly regulated diet, with suitable injections of insulin to supply the deficit that the body fails to manufacture, often appear better nourished than their normal playmates.

Admitting that taking insulin injections several times a day is no fun, Dr. John stressed the fact that diabetic children gain valuable lessons by the self-discipline and persistence they have to practice.

He said: "Having diabetes has made them better persons, I think." Children with diabetes are generally bright.

"Some of the children I have cared for have gone through college with honors and are now filling important positions," the specialist stated.

In feeding diabetic patients, Dr. John warned the dietitians against indiscriminately giving doses of insulin half an hour before meals. If the patient's blood sugar chances to be high, no harm is done. But if it is low, the lapse of time may result in an insulin reaction setting in. The child is then reduced to a dazed state of extreme artificial hunger. He gulps his food wolfishly, getting no pleasure, and digestive processes may be disturbed.

Standing orders of this type which are to be found in many hospitals are thus not only most unscientific," said Dr. John, "but are actually barbarous at times." — *Science News Letter*.

Ear's Pattern of Nerve Cells Like Player Piano Record

"Like the paper record for a player piano."

That was the graphic description of the mathematically precise arrangement of nerve cells in the little known basilar membrane of the inner ear given by Dr. Dorothy Wolff, of Washington University Medical School, speaking before the American Association for the Advancement of Science.

This tiny ear membrane, a most important part of the hearing apparatus, is like a wire bent to form a rather angular C but also coiled spirally so that it is in three planes, Dr. Wolff said. The wire is not smooth, but is strung with "beads" which are nerve cells. These beads are grouped in clusters as are grapes on a stem, the "bunches" growing largest at the lower part of the middle turn of the spiral and at the top.

In the ears of lower mammals, the nerve cells are more closely packed into the canal that holds them than they are in man or monkey. In rats they are so close that they are forced into a hexagonal shape. In man, they are round or oval.

Nerve fibers are not like straight wires running direct from one point to another, according to Dr. Wolff's description. Instead, they interlace in the most complicated fashion. — *Science News Letter*.

New Aid for Atom Study Announced at Ohio State

Still another new tool by which scientists can probe the secrets of the atom and effect transmutation of the elements has been developed at Ohio State University, according to an announcement from the department of physics and astronomy.

The new weapon of science is the first successful production of strong narrow beams of negatively charged hydrogen atoms which can serve as "bullets" for use in atom bombardment research. It is the work of Dr. Willard H. Bennett and Paul Darby of the physics department.

The hydrogen atom normally consists of one positively charged nucleus called the proton, and one negatively charged electron. It is now well known that these electrons can be knocked off and beams of protons or positively charged hydrogen atoms obtained. Positive ion beams of most elements have been familiar in laboratories for 30 years or more.

But never before, according to Ohio State scientists, has anyone been able to attach extra electrons to atoms and make them stick in sufficient quantity to obtain beams of negatively charged ions.

Production of the negative ions in quantity is described as having far-reaching effects in research with the new million volt tube at Ohio State by which transmutation of the elements is effected.

Since scientists previously have been unable to obtain negative beams of any element, the physical properties of such ions themselves hold great interest and will be a subject for further study. They are thought to play a decisive rôle in the production of striations in glow discharge, a familiar case of which is the discharge in a neon sign.

An "electron microscope" played a prominent part in the discovery of these beams. This "microscope" is a vacuum tube whose parts focus the beams of charged particles on a screen, just as the lenses in an ordinary microscope focus the beams of light on a screen.

In the work at Ohio States, the "microscope" was so used that ions of all masses and charges could be focussed on one screen and then separated by a transverse magnetic field. — *Science News Letter*.

Scientist Calculates Mass of the Universe

Take the figure 2 and add 55 ciphers after it and you will have the mass of the universe expressed in grams!

That, in effect, is the report of the famous Viennese physicist, Prof. Arthur Haas, before the meeting of the American Physical Society. Prof. Haas is this year visiting professor of physics at Bowdoin College.

Prof. Haas did not weigh the universe to find its mass, as might seem necessary to the layman. His result was based on theoretical calculations whose interest to scientists is the fact that they were made without the use of customary helps like relativity theory, the concept of an expanding universe, the curvature of space or astronomical data.

From the same calculations Prof. Haas derived the number of particles in the universe and the radius of a spherical volume of space over which astronomical objects are distributed.

The number of particles amounts to the figure 12 with 78 ciphers after it. And the radius in centimeters of the volume of space is expressed as 93 with 25 ciphers following. — *Science News Letter*.

Discovery of "Germ-Eater" for TB Bacillus Claimed

Discovery of a bacteriophage or "germ-eater" for the bacillus that causes tuberculosis has been reported by William Steenken, young bacteriologist at Trudeau Research Institute for Tuberculosis.

Trials are now being made to determine the new phage's effectiveness as a treatment for tuberculosis. It is too early to know the value of the new substance, but there seems a possibility that it may prove to be the long-sought "cure" for the white plague.

Since the discovery of bacteriophage in 1918 by Prof. F. d'Herelle, the eminent French-Canadian scientist, a search has been in progress to obtain a principle of this sort which would be active against man's great enemy, the tubercle bacillus. Success seems to have crowned Mr. Steenken's efforts along this line.

Paralleling the observations of Prof. d'Herelle that bacteriophage destroyed the dysentery bacillus by a process known as lysis, Mr. Steenken has noted lysis or destruction of the tubercle bacilli in cultures of them kept at a certain degree of acidity. Scientific details of the investigation were reported by Mr. Steenken in a preliminary note to the Society of Experimental Biology and Medicine (*Proceedings*, Nov. 1935.)

The phage or lytic principle obtained by Mr. Steenken is said to convert virulent types of tubercle bacilli into avirulent harmless ones, when in the test tube. There seems to be a possibility that the lytic principle may do the same thing to tu-

bercle bacilli in the body, and experiments are now under way to determine this point.

Mr. Steenken's bacteriophage has not yet been tried on human cases. Tests on animals, however, already indicate the value of attempting to use it to vaccinate human beings.

Another similar substance with possible value as a weapon against tuberculosis has been isolated by Dr. Hugh E. Burke of New York State Hospital at Ray Brook, near Saranac Lake, N. Y. Working along lines similar to Mr. Steenken's research, Dr. Burke has obtained a substance from organisms other than the tuberculosis bacillus — namely, *Bacillus pentacecticus* — which digests the starch out of the tuberculosis "germ," leaving the latter in a harmless form. Mr. Steenken's tubercle-bacillus-destroying principle, on the other hand, is intrinsic in the virulent tubercle bacillus giving rise to the avirulent form. — *Science News Letter*.

Rabies Menace Increases; Medical Men Urge Action

A quicker and more positive test for rabies and a less cumbersome method of vaccination must be found, declares the *Journal of the American Medical Association* in one of its leading editorials.

Last year's alarming situation in regard to dog-bites and rabies appears even more menacing this year, the medical journal asserts.

More than 100 persons have been bitten by dogs daily in Chicago alone in recent warm days, a 50 per cent increase over the number of bites during the similar period of 1936.

"Immediate and coordinated action is necessary," the *Journal* states. "Rabies is a disease in which individual efforts are relatively helpless unless aided by the full machinery of social organization.

"The press, public health officials, the police and physicians — in both their individual and their official capacities — should take steps to combat this threatening situation at once if a considerable number of unnecessary deaths is to be avoided.

"In the face of the now existing information as to the frequency and rapid spread of rabies among animals, it seems criminal to postpone action until the disease is identified in human beings.

"Because rabies is primarily a disease of dogs, it seems likely that this campaign will have the whole-hearted support for all the animal humane societies." — *Science News Letter*.

Annual Meeting Academy of Physical Medicine

Announcement is made of the annual meeting of the Academy of "Physical Medicine," of which the late Dr. Tait McKenzie was president, to be held at the Willard Hotel, Washington, D. C., from October 24th to 26th, inclusive. All physicians and technicians are invited to attend the meetings. The tentative program includes papers by Drs. Fred H. Albee, Le Roy W. Hubbard, and K. G. Hansson.

THE STUDENT'S LIBRARY

GRUNDLAGEN DER GYNÄKOLOGISCHEN KURZWELLEN-THERAPIE. Von Dr. med. habil. *Ernst Raab*. With a preface by privy councillor Prof. Dr. *H. Stoeckel*. Paper. Pp. 66, with 29 illustrations. Price Rm. 4.80 (less 25 per cent). Stuttgart: Ferdinand Enke Verlag, 1938.

It is regrettable that the majority of specialistic gynecologists have paid no or at least very little attention to the employment of short wave diathermy especially in acute pelvic inflammation. Perhaps the preface by Stoeckel, an internationally known authority, more than the author's actual publication, to the effect that the new method has already proved successful will be an inducement to give short wave diathermy a thorough trial in many gynecologic conditions. Raab, after presenting in eight short pages the physical and biologic fundamentals, at once presents a series of experimental studies to show the effectiveness of deep radiation, which in part also contain observations concerning the harmful effects of short wave diathermy by overdosage. The next section of the brochure is devoted to the general and special techniques required in gynecology, and this contains much that is new and original. The clinical part considers the application of this form of radiation therapy to inflammatory tumors of the adnexa and to various forms of infections of the female genital apparatus, a special part being devoted to non-inflammatory affections, radiation of the hypophysis for menstrual disturbances, and the management of mastitis. Raab makes no exaggerated claims but in the light of his own experiences and that of other authors he considers short wave diathermy as a thermo-electric method of therapy superior to all other similar methods because of its depth effects. For this he advises that it is best not to exceed 12-meter wavelengths, though success depends more on technic and dosage than apparatus. In his bibliographic references not a single American contribution is mentioned. All in all, however, the small monograph is a valuable addition to the literature on short wave diathermy.

OPERATIVE BEHANDLUNG DER SCHENKELHALSBRÜCHE UND SCHENKELHALSPSEUDARTHROSEN UND IHRE ERGEBNISSE. Von Dr. *Lorenz Böhler*, Leiter des Unfallkrankenhauses, a. o. Professor für Chirurgie an der Universität Wien, und Dr. *Wilhelm Jeschke*, Sekundararzt des Unfallkrankenhauses. Cloth. Pp. 201, with 533 illustrations. Price Rm. 24. Vienna: Wilhelm Mandrich (American Agency; Chicago Medical Book Co., Chicago) 1938.

In the March issue of the *ARCHIVES* appeared a review of the first volume on fractures and dislocations by Professor Böhler, which was described as exhaustive. The question arises why the same author, aided by his assistant, has added a monograph dealing with the operative management of fractures of the neck of the femur and their resulting give up the attempt of reconstructing them for abso-

pseudarthroses to his encyclopedic work. The answer is found in the special details which could not possibly be incorporated even in a two-volume text. Basing on the enormous material which has been at the disposal of the authors they have not only utilized the experience gained for the presentation of diagnosis and technic, but have evaluated the diverse operative methods by the clinical results. An idea of the value of the book can be had from the fact that there is a section giving brief histories of 78 cases of pseudarthrosis each being illustrated with three roentgenographs. The technic of operative therapy is given in the minutest details and the results, good, indifferent and bad are discussed critically. We have not the space to enumerate the titles, but it can be stated that there is not a question that has ever been raised in connection with the diagnosis and treatment of the injuries under discussion that is not fully answered and analytically discussed. When one considers that in a text of about 200 pages there are nearly three times that many illustrations, one will appreciate that all who are interested in overcoming the usual difficulties of attaining perfect anatomic and functional results in fractures of the neck of the femur will find this volume a veritable postgraduate course. Those who master medical German and are engaged in industrial surgery should study, not merely read, this valuable exposition of a serious problem in fracture surgery.

MEDICO-LEGAL ASPECTS OF THE RUXTON CASE. By *John Glaister*, M.D., D.Sc. Barrister-at-law, Regius Professor of Forensic Medicine, University of Glasgow, and *James Couper Brash*, M.A., M.D., F.R.C.S. Ed., Professor of Anatomy, University of Edinburgh. Cloth. Pp. 284 with 172 illustrations. Price \$6.00. Baltimore: Wm. Wood and Co. 1937.

Many readers will no doubt recall the newspaper accounts of a double murder committed by a Dr. Ruxton, practicing medicine in Lancaster, England, and his ultimate legal execution for the crime. While the story is gruesome and some of the photographic illustrations even more so, the main feature of this monograph is a highly scientific work which clearly shows what modern medical science can accomplish in the field of fighting crime by legal methods. Apart from the circumstantial evidence, a great part of which is given in the story, the main problem was so to produce evidence of the identity of the two victims that it would prove acceptable in an English criminal court under the legal code. Ruxton in a frenzy of jealousy had killed his wife and a young maid in his household, and had disfigured and mutilated the two bodies and actually hacked them to pieces evidently with the intent of rendering their identification a physical impossibility. Indeed, as the small parts were found and assembled in and near a river—most of which are illustrated—even one thoroughly familiar with anatomy would

lute identification according to their appearances in life, yet this task with infinite patience and with a precision worthy of the highest admiration was achieved by the authors. It is worth the reading and re-reading to learn the scientific details of the laboratory methods that were employed. Physicians who occupy positions as advisers to the legal authorities will find in this volume proof that Medical Jurisprudence is a concrete science. Those interested in anatomy and hematology will find much food for thought, while those who generally enjoy detective fiction will read a story of fiendishness and retribution that is fascinating in even the minutest details.

DEUTSCH-ENGLISCHES MEDIZINISCHES WÖRTERBUCH. Von Dr. *Morris Katz*. Seventh revised edition by Dr. *Franz von Brattenberg*. Cloth. XII-o, Pp. 238. Leipzig and Vienna: Franz Deuticke, 1938.

The sixth edition of this pocket size German-English dictionary appeared in 1932, hence appears to be a favorite with those who do not master German fluently. It actually contains almost as many terms as is found in the larger medical dictionaries in the two languages, which is explainable by the avoidance of words which are so similar in both languages that their publication would be almost repetitions. The comparative endings are described. The book contains a list of common German medical abbreviations and several comparative tables. If one make use of a general dictionary to secure a translation of such words which are descriptive rather than technical in addition to the small medical dictionary, one who can read ordinary German will find the latter a valuable aid.

AN ELEMENTARY SURVEY OF PHYSICS. A NON-MATHEMATICAL PRESENTATION WITH A SPECIAL SUPPLEMENT FOR PRE-MEDICAL STUDENTS. By *Arthur E. Haas*, Ph.D. Professor of Physics at the University of Notre Dame, with the collaboration of *Ira M. Freeman*, Ph.D. Associate Professor of Physics, Central College, Chicago. Cloth. Pp. 203 with 74 illustrations. New York: E. P. Dutton & Co., Inc., 1938.

As the title implies this small volume is neither a textbook nor a critical review of physics but actually a brief survey which evidently has been prepared for students with some knowledge of the fundamentals and for readers interested in special subjects who desire to obtain a rapid survey preceding more detailed collateral study. Such subjects as solids, liquids, gases and acoustics are surveyed in the first part. Heat and optics are grouped in the

succeeding two parts, while the fourth and last main part is devoted to electricity. Physicians will be greatly disappointed in the presentation of the subject of high frequency currents because they will look in vain for the real discoverer of this energy, Professor d'Arsonval. Although the work is claimed to be "non-mathematical" it is replete with formulae, so that those unfamiliar with them will often find themselves handicapped. In a supplement for pre-medical students there are brief notes giving a cursory notion of bodily energy, the auditory mechanism, voice, sight, color vision, light therapy, electrotherapy, short-wave therapy, x-ray diagnosis and radiotherapy. It is amusing to read that there are definite wavelengths for various organs and for many diseases, but the authors hasten to qualify this statement by the comment that "an adequate explanation of this fact has not yet been given." In the domain of non-medical physics the authors state absolute and authentic facts and one will not go amiss in perusing the data, some of which have a direct bearing on medical science.

THE DEUCE OF REDUCING. By *Katherine Mitchell*, Administrative Dietitian, Los Angeles County General Hospital, Formerly Director of Dietetics, Michael Reese Hospital, Chicago and Director of Dietetics, Peiking Union Medical College. With an Introduction by *Morris Fishbein*, M.D. Cloth. Pp. 112. Price \$1.50. New York: Covici, Friede, Publishers, 1937.

While this small contribution to the problem of reducing weight by diet has been prepared for the general public, it will be read with profit, and a good deal of amusement, by all physicians interested in the problem taken up by the authoress who knows more than her onions. Dr. Fishbein's introduction is actually a survey of the application of diet to reduce bodily weight and a strong recommendation of the suggestions contained in the text proper. Miss Mitchell calls her four principal chapters "lessons," and lessons they are in that she handles her readers as if they were living beings calling on her personally for advice and aid. She chats with them, appeals to their fortitude and even gives practical hints how to avoid the temptations which befall all those who are placed before rich dinners and cannot fully partake of them. Perhaps the most valuable phase of this little book is that it presents the problems of overweight, the nature of food, the role of calories and the like so clearly that any one can readily appreciate the why's and wherefore's of a number of excellent menus outlined. An excellent book to recommend to concerned patients, and, as was already stated, to be read by interested practitioners of medicine.

INTERNATIONAL ABSTRACTS

Vaginitis and Cervicitis. Melvin A. Roblee.

J. Missouri M. A. 34:285 (Aug.) 1937.

If the cervix is chronically infected and the gland bearing area is hypertrophied, the pH 7.5 secretion will be in abundance and vaginal pH readings will fall in the plus 2 group. It is then necessary to remove the hypertrophied gland bearing area of the cervix, the erosion now being healed, or the syndrome of vaginitis will return. This is done by surgical diathermy, coagulation, conization or the Sturmdorf operation as the case may be best handled. If surgical diathermy is used, either coagulation or conization, beta lactose is added at the time and later by the patient, so the slough will separate in an acid environment of non-pathogenic organisms rather than the putrefactive alkaline variety. Nothing has been said of the trichomonas vaginal infections. These can live in the plus 2 range along with the milder infections, but cannot live in an environment of from pH 4.0 to 4.5. Hence the outlined therapy takes care of these offenders without any difficulty.

Roblee prescribes acid douches of white vinegar which is readily obtained and is U. S. P. acetic acid 5 per cent, three tablespoons to the quart of water, once a day during each day of the menstrual flow. This removes the alkaline blood, retards the bacterial growth and helps keep the squamous cervical epithelium in an acid environment. Douching at any other time is discouraged or prohibited in severe cases as the beta lactose should not be washed out. It is an anhydrous powder and will take up moisture and if diluted by douching it cannot adhere to the vaginal walls and promote the growth of Döderlein bacilli which keep up the normal vaginal acidity. The two most commonly used douches, baking soda and lysol, are both alkaline of from pH 8.5 to 9.0 and must be condemned in no mild terms.

Ultraviolet Spectrophotometry of Biologic Fluids.

I. Blood Plasma Following Immunization to Alpha Crystalline Lens Protein. II. Tetanus and Diphtheria Antitoxic Serum. F. Lowell Dunn, and A. T. Sudman.

Arch. Path. 24:454 (Oct.) 1937.

Following immunization with alpha crystalline lens protein the ultraviolet ray absorption of blood plasma in the rabbit does not deviate significantly from the normal. The ultraviolet ray absorption of diphtheria and tetanus antitoxic serums resembles very closely the results reported by Svedberg and Sjogren and by Marchlewski and Wierzychowska for serum globulin. The ultraviolet ray absorption of blood plasma

has been determined in the normal fasting rabbit over periods of from four to six months.

Treatment of Obliterative Vascular Disease by Intermittent Venous Occlusion. J. J. Mason Brown.

Brit. Med. J. 4028:616 (March 19) 1938.

The method originally introduced by Collens and Wilensky (1936) was based on the observation of Lewis and Grant (1925) that following venous obstruction there is a reactive hyperemia in the tissues distal to the obstruction, lasting for the period of occlusion. The apparatus used consists of an electric pump which raises the pressure in a cuff surrounding the affected limb. The cycle is controlled from the electric motor in such a way that the pressure is maintained for two minutes at two-minute intervals. The pressure in the cuff is regulated by a safety-valve, and can be varied from 20 to 120 mm. Hg.

Pelvic Tuberculosis. James E. King.

Am. J. Obst. & Gynec. 35:520 (March) 1938.

No patient should be operated upon for tuberculous salpingitis in the presence of pulmonary involvement. This is not so much on account of any objections to surgery itself, but because the pelvic process is the less serious of the patient's infections. Three or four weeks in a hospital following operation may result in extension of the pulmonary process. Radical surgery is seldom required. An ovary should be removed only when abscessed, or when it is infiltrated with tuberculosis. The surface implantations may be ignored if proper post-operative treatment is carried out. The adhesions associated with pelvic tuberculosis are so dense that, as a rule, no line of cleavage is found as in other infections. Freeing adhesions necessary for removal of the tubes is done by sharp dissection; all others are left undisturbed. Where pus is encountered, rubber tube drainage is always used. Drains were employed in 8 of 26 cases, and no fecal fistula followed. The sinus that may follow can always be cured by appropriate measures. Every case of pelvic tuberculosis, regardless of how successful surgery may have been, should be followed by sanitarium treatment with heliotherapy. It is surprising how casually this most important part of the treatment is mentioned, if mentioned at all, by those who discuss treatment. This feature is most essential, and should always be strongly emphasized. It is unfortunate that sanitarium treatment consumes so much time, but at present there is no substitute. Following operation, the patient should be moved as promptly as possible to such an institution. The general condition of

the patient will improve rapidly. A sinus, if present, will heal. What is still more important, it is the only means of healing the primary focus that has supplied the bacilli.

Diagnosis and Treatment of Tuberculous Tracheobronchitis. Wadsworth Warren; Arthur E. Hammond, and William M. Tuttle.

Am. Rev. Tuber. 37:315 (March) 1938.

Tuberculous tracheobronchitis is a new clinical disease entity. Three methods of local treatment have been used. The actual cautery was first employed in view of the favorable results which it had given in the treatment of laryngeal, lingual and buccal tuberculosis. The results obtained from this method were good, but the technical difficulties of manipulating a red-hot wire, which did not cool at once when the current was shut off, offered certain disadvantages. It was abandoned in favor of the Kernan cautery, activated by a low high frequency coagulating current. Within the past year a solution of 30 per cent silver nitrate has been used. It appeared that this strength gave the best results. The majority of the cases reported have been treated with the last two mentioned methods.

Bronchoscopic examination performed on 198 tuberculous patients showed ulcerative or stenotic lesions of the bronchus and trachea in 71 instances. Fifty-seven cases of tuberculous bronchitis or tracheitis have been treated; of this number, 34 healed, 10 progressed or did not improve, and 9 are still under treatment.

There were 31 patients in whom the sputum was positive in spite of apparent control of the parenchymal disease. In this group healing of the bronchial ulceration was followed by prompt sputum conversion in 22 out of 26 healed cases.

Electrosurgical cauterization has proved of decided value in tuberculous tracheobronchitis.

Scapulo-Humeral Periarthritis (Duplay's Disease). A. H. Douthwaite.

Brit. Med. J. 4025:422 (Feb. 26) 1938.

Chaumet advises treatment by means of radiant heat, diathermy, and gentle manipulations. In obstinate cases he claims to secure good results by the application of x-rays thrice weekly. He states that even the linear calcification may disappear. Tiegel advises rest in abduction and the application of heat for acute cases. The chronic ones he treats with fruit juice, raw fruit and vegetables, baths, and exercises. He concludes by referring to the cure of one case. It should, however, be quite obvious that only mechanical means can be effective in producing a cure. Except in the earliest cases, where rest in abduction and heat followed later by massage may be sufficient, scapulo-humeral periarthritis should be treated by manipulation under anesthesia. This has resulted in every case in complete restoration of movement. In all except two patients all the symptoms and signs have disappeared in a few weeks. In the two exceptions pain has persisted to some extent. Evipan or pentotal gives sufficient time

for the work. The scapula should be immobilized so far as possible by a band passing around the chest and held on the opposite side by the assistant. Forced shoulder movements must be brisk, and should be carried out in all the normal planes of movement. At certain points resistance will be encountered, and with further effort loud snaps will be heard. If there are a great number of resistant points it is unwise to break down all the adhesions at one sitting.

Post-manipulative pain is usually severe for one to two days. Dilaudid, 1/12 grain thrice daily, should be given for this. The arm must be abducted from the start, but the use of a splint is seldom necessary. If hard pillows are well packed into the axilla the position will be held well enough. Massage to the shoulder muscles and passive movements must be given within six hours of manipulation even though they are painful. Twice daily this physical treatment should be continued, and within three days active exercises should be begun. The ultimate success depends entirely upon the work of the masseuse and the cooperation of the patient. The total duration of treatment varies from two to twelve weeks according to the chronicity of the lesion. Treatment with x-rays, baths, and dieting is futile and wastes time.

Carbuncle. J. K. Berman.

Am. J. Surg. 40:419 (May) 1938.

Conservative treatment was used in 20 per cent of the cases and half of these had serious associated conditions. Incision was used in thirty-two patients (26 per cent) and of these fifteen (or 46.8 per cent) had associated conditions. Excision was employed in sixty-seven patients (54 per cent); of these ten (14.9 per cent) had associated conditions. It is readily seen that conservative treatment and incision were the treatment of choice in those most seriously ill.

The term conservative is variously interpreted by many surgeons. Such measures as hot hypertonic packs, x-ray, Bier's suction, MgSO₄, and glycerine, injections of serum about the carbuncle, diathermy, various antiseptics, ultraviolet ray, collodion treatment all have their strong advocates. However, the term is used to mean first rest in bed, with ample sedation to relieve pain, careful attention to fluids, food elimination, and attention to diabetes if present. Locally, dry or moist heat for the comfort of the patient may be used. As the skin becomes necrotic and multiple sinuses develop, their apertures may be connected painlessly in separate stages by incision without anesthesia, and loose sloughs may be lifted out. In several cases x-ray has been used with some help.

Treatment of Arthritis With Artificial Fever. E. Stecher, and W. Solomon.

Am. J. M. Sc. 194:485 (Oct.) 1937.

Stecher and Solomon present the results that they obtained in twenty patients suffering from acute nonspecific infectious arthritis who, in ad-

dition to fever therapy, were given rest in bed and acetyl-salicylic acid as indicated. Not only did 60 per cent of the twenty patients make complete, prompt recovery and 40 per cent have partial relief, but the duration of the disease was shortened in all, its severity decreased, the incidence of damage to the joints lessened and the damage that did occur minimized. These results compare favorably with those which have been reported in cases of gonorrheal arthritis treated with fever therapy. The twelve patients receiving complete relief had arthritic symptoms from one to ten weeks before fever therapy was instituted. These patients received from two to twenty-five hours of fever (105 F.) for relief (average 7.3 hours). The eight patients having only partial relief had arthritic symptoms from two to sixteen weeks before fever therapy was instituted. This group received from five to thirty hours of fever (average seventeen hours). Five of the six patients showing x-ray evidence of damage to the joints were of the group of longer duration, indicating the importance of prompt therapy. Although the treatment of acute infectious arthritis with artificial fever must be regarded as empirical, its use is not without precedent. — [Abst. J. A. M. A. 109:1755 (Nov. 20) 1937.]

Röntgen and Ultraviolet Radiation in Dermatology. D. E. H. Cleveland.

Canadian M. A. J. 37:558 (Dec.) 1937.

The quartz-lamps are considered to have a higher therapeutic efficiency than carbon-arc lamps. They generate ultraviolet containing a much higher proportion of the short wavelengths, and shorter rays are produced than are obtained from the carbon-arc. The shortest rays, while possessed of high chemical activity, are insufficiently penetrating to pass the upper layers of the epidermis, but a large proportion of rays reach the germinal layer of the epithelium and are yet short enough to produce the required effects. These rays act, as do the x-rays and gamma-rays of radium, chiefly on immature and undifferentiated cells, next on actively growing and functioning cells, and least on fully mature and highly specialized cells. By their action on capillary endothelium they increase local circulatory activity, stimulate metabolism, and improve nutrition. If the dosage is not excessive a sedative effect on the sensory nerve-endings is obtained.

The shorter wavelengths of ultraviolet are lethal to bacteria, but they have insufficient penetration to reach the most superficially placed organisms in the skin. The direct bactericidal effect of ultraviolet is therefore negligible. Ultraviolet radiation does, however, effect an increase in the leukocytes in the skin and their migration into the epidermis and a resulting increase in activity and efficiency of local defense. This and the increased bactericidal power of the blood in the area probably explain the spectacular results obtained from ultraviolet radiation in the treatment of erysipelas.

In furunculosis and superficial pyodermias similar results are not obtained, although occasionally some benefit appears to be obtained by the effect on metabolism from generalized radiation. In impetigo ultraviolet as a useful form of treatment has long been abandoned. In many cases a dermatitis produced by the infra-red and long ultraviolet on the surrounding skin seems to be accomplished by a depressed vitality and loss of defensive powers throughout the radiated area, facilitating the rapid spread of the infection.

Acne, including the pustular varieties, is temporarily improved by ultraviolet. The beneficial results commonly seen after a summer of sun-bathing are probably due in large part to the drying effect of wind, hardening the skin, and the general metabolic stimulation. Thickened, greasy, comedone-laden and pustular skin in acne can be greatly improved by blistering and exfoliation from natural or artificial ultraviolet. Recurrence takes place in autumn or when the ultraviolet treatment is discontinued.

Ultraviolet is not fungicidal. The drying effect of sun-bathing and the freedom from infected clothing sometimes results in a temporary cure in tinea versicolor. The drying and scouring effect of walking about in dry sand and exposure to sun also produces an environment on the feet unfavorable for the growth of a fungus, and sometimes may produce a temporary or even permanent cure in dermatophytosis of the feet. In ringworm of the scalp ultraviolet is of no value, although it is commonly tried. Ultraviolet is also useless in some other cutaneous infections, such as sycosis vulgaris, paronychia, granuloma pyogenicum, and infectious eczematoid dermatitis. In skin eruptions due to focal infections, such as lupus erythematosus and erythema multiforme, the rays appear to sensitize the skin to circulating toxins and increase the extent of the disease. In alopecia areata, when the original cause has ceased to operate, ultraviolet appears to stimulate the regrowth of hair. It is useless in old cases where the skin and hair-papillae have become atrophied.

X-Rays, Radium and Electrosurgery in Treatment of Cancer of Skin. W. M. Sheridan, and Paul Elkin.

J. South Carolina M. A. 34:94 (April) 1938.

Electrocoagulation alone has not been found suitable in the treatment of basal and squamous cell cancer. It may be used preliminary to radium therapy. When the growth is burned flat with the skin, radium may be applied to the base of the lesion and then will be much more effective. Radium is used only when the lesion is small and flattened, as it is difficult to apply it so that it will deliver the same dose to all parts of a large tumor. The authors have healed with x-ray many cases of cancer of the skin, which had occurred after radium therapy was administered elsewhere. After questioning the patient and the doctor who applied the radium, the failure of the treatment was nearly always found to be due to an insufficient dose. Cancer

of the skin will sometimes fail to respond to a second series of treatment; and since death will result if the cancer is not destroyed, application of radium should be made by those who have had adequate training and experience and who have proved their fitness by passing the examination on radium therapy given by the American Board of Radiology. Until 1928, radium had one advantage over x-ray therapy in that, after measurement of the radium applicator by the Bureau of Standards, the quantity of the radiation emitted was constant, since radium only depreciates one per cent in 25 years.

Reversed Iontophoresis of Histamine From Human Skin. Its Bearing on Histamine Theory of Allergic Wheal. H. A. Abramson; M. Engel; V. Lubkin, and I. Ochs.

Proc. So. Exper. Biol. and Med. 38:64 (Feb.) 1938.

By standardization of both metallic and absorbent electrode material, an iontophoretic method has been developed which permits the detection of histamine in dilutions as high as 1:5,000,000 by the formation of wheals in the human skin. The method has been serviceable in the development of a procedure for assaying histamine in human, rabbit, and guinea pig blood. Thus, histamine can be assayed directly in the blood of rabbits killed by the intravenous administration of histamine. Only 0.1 cc. of blood is required.

When histamine is administered by the galvanic current so that a wheal forms in the human skin, the positive pole is applied to force the positively charged histamine ions into the skin. It has now been found that if the negative pole be applied to the surface of the wheal formed by the scratch or the iontophoretic method, sufficient histamine is transported out by this reversal of iontophoresis to form secondary wheals in new areas of the skin. In this way, histamine has been recovered from wheals which have been produced by iontophoresis from original dilutions as high as 1:100,000. Histamine may be recovered by diffusions alone, sufficient being readily obtained for detection by means of the preceding methods within a diffusion period as short as 3 minutes. Histamine has been recovered from wheals produced by higher concentrations for as long as 40 minutes after wheal formation.

Nasal Ionization. A. R. Hollender, and Noah D. Fabricant.

Arch. Otolaryn. 37:452 (May) 1938.

Leduc in 1908 suggested ionization for intumescent rhinitis, and later Friel advocated the treatment for certain conditions of the nose and sinus. It is probable that other European and American workers early employed nasal ionization. In 1926 Cottle and Hollender published a report on the efficacy of zinc ionization in relieving the milder forms of hypertrophic rhinitis. Although the method had been tried in cases of vasomotor rhinitis, a lack of uniform

results made it undesirable to present this phase of the problem to the medical profession. Since then there have been periods during which ionization has been largely recommended not only for basal allergy but for a variety of diseases in other parts of the body.

The authors question the present method of histologic study of the nasal mucosa. It seems that all investigators in attempting to evaluate the histologic observations after nasal zinc ionization have committed the same error. Too often the state of the nasal mucosa prior to ionization, which was regarded as "normal," was in reality pathologic. Biopsy is too restricted to yield sufficient or adequate information about the entire nasal mucosa. Evaluation of the status of ionization with respect to vasomotor rhinitis and other types of nasal allergy must be obtained clinically rather than by microscopic investigation. The theoretic assumption that ionization produces harm in the nasal mucosa is not supported by histologic evidence. It can be asserted definitely that the electrocautery, drugs, chemicals, roentgen rays, radium, surgical trauma cause far greater insult to the nasal mucosa than ionization.

Electropyrexia in Rheumatic Carditis, Chorea and Other Childhood Diseases. S. L. Osborne; Maurice L. Blatt, and Clarence A. Neymann.

Physiotherapy Rev. 18:68 (March-April) 1938.

In a series of 25 patients suffering from chorea minor, no less than 7 had some degree of carditis. Ordinarily the authors treat chorea with eight hours of temperature ranging between 39.7 and 40.5 C. (103.5 and 104.9 F.). If artificial fever really places too great a load on the patient's heart and exhausts the cardiovascular reserve, certainly something should have happened to these children who, in addition to rheumatic carditis, were suffering from chorea. Besides, they were all poorly nourished and were distinctly not of the type one would select as good risks.

Artificial fever does not adversely affect the normal heart or the cardiovascular system, if the doses are those normally employed for the treatment of disease, ranging up to 42 C. (107.6 F.) sustained from five to eight hours. Rheumatic carditis does not preclude the use of electropyrexia. On the contrary, children and adults with rheumatic carditis may be aided by hyperthermic sessions ranging near 40 C. (104 F.) for eight hours. Other forms of heart disease are not adversely affected by artificial fever if the heart is not decompensated. Children may be treated with electropyrexia with temperatures ranging up to 40.55 C. (105 F.) sustained for eight hours. This is a perfectly safe procedure provided penetrating heat, that is electromagnetic induction, is used to produce the fever. The choreiform movements of Sydenham's chorea cease in 88 per cent of the cases treated with artificial fever. The movements stop after an average of four sessions, which justifies the belief that the disease is thus aborted and will not recur.

Antirachitic Potency of Ergosterol Activated by Low Velocity Electrons. Irvine McQuarrie; W. H. Thompson; A. V. Stoesser, and L. G. Rigler.

J. Pediat. 10:295 (March) 1937.

Of four previously described methods of converting inactive ergosterol into vitamin D, ultraviolet irradiation alone has thus far proved of practical value. Cathode rays and radium emanations have also been shown capable of activating ergosterol. Up to the present time, however, these two procedures have not been found applicable on a commercial scale. Bills demonstrated that certain sterols can be endowed with antirachitic properties by chemical means, but this procedure is too complicated for practical use. The low velocity electron process is an entirely new method for activating ergosterol. Like the ultraviolet ray process, it can be employed on as large a scale as may be desired, and therefore represents a fundamental contribution to our knowledge of vitamin D.

The method of activation is fundamentally different from the ordinary photochemical procedure with ultraviolet radiant energy. In the latter process, energy necessary for causing the transformation of ergosterol into an antirachitic substance is absorbed from sources of ultraviolet radiant energy having a well-defined frequency between certain critical limits. It has been found that the energy for this purpose can be obtained also from low velocity electrons. In this process the electrons are caused to impinge on the ergosterol molecule, and under proper conditions the resulting exchange of energy causes the conversion of the ergosterol molecule to vitamin D. Due to the highly technical character of the process the initial activation, the subsequent purification, and the final addition of the product to a suitable vehicle, such as a vegetable oil, are all carried out under the constant supervision of a scientifically trained personnel.

Galvanic Treatment of Atrophic Rhinitis and Ozena. Joseph S. Stovin.

Arch. Otolaryng. 25:305 (March) 1937.

From the present knowledge of the pathologic picture in atrophic rhinitis and ozena it is evident that to treat such conditions successfully one must improve the blood supply to the nasal mucosa, by vasodilatation. The local treatment that has proved most satisfactory, both for atrophic rhinitis and ozena, is the galvanic current.

Up to one year before the author depended solely on the stimulating effect of the current on the mucous membranes and nerve endings and not on the electrolytic effect of any medicinal agent, such as zinc sulphate. The stimulation of the mucous membrane produced by the galvanic current tends to restore its normal physiologic function. In ozena, even after one or two treatments, there is disappearance of the foul odor. This treatment, of course, does not

narrow the nasal cavities, but improves the membranes and the sense of smell.

As in ozena and to a lesser extent in atrophic rhinitis, there is endarteritis with narrowing of the blood vessels and a diminution of the blood supply, treatment was given with mecholyl by iontophoresis in the nose in a series of patients.

Before the galvanic current is applied, the nose is thoroughly cleansed by the wet suction method with a warm physiologic salt solution. The fluid is run into one nostril, the head being lowered, while the patient says K-K-K, and the return flow is sucked from the other nostril into a suction bottle. The nasal tips are alternated several times during the procedure, so that the nose will be thoroughly cleansed of all mucous and crusts. Each nasal cavity is then packed completely with successive layers of strips of absorbent cotton which have been dipped in the mecholyl solution, care being taken to surround the turbinates.

In most cases of ozena, the loss of the foul odor after this procedure is striking. In simple atrophic rhinitis a notable result is restoration of the sense of smell.

However, on careful analysis of the results obtained with mecholyl and comparison of them with those observed with the use of physiologic solution of sodium chloride, the conclusion is reached that there is no appreciable difference, that mecholyl as a medium is no more effective than sodium chloride and that the benefit derived from this treatment is due to the galvanic current itself.

Effect of Compressed Air Baths Upon Emphysema. G. E. Beaumont, J. F. Dow.

Lancet 232:685 (March 20) 1937.

The compressed-air chamber was originally employed in the treatment of almost any chest disease. Soon its limited value was discovered and its range became narrowed.

In order to test whether the compressed-air bath does bring into use previously dormant alveoli, nine patients suffering from moderately severe emphysema were examined while undergoing this treatment, and vital capacity estimations were made before and after treatment. The initial vital capacity reading in each case was considerably below the calculated normal. Each patient showed clinical and radiological evidence of generalized emphysema. The course of treatment given twice weekly lasted about two months. At each treatment the pressure was increased gradually until it reached one and two-thirds atmospheres at the end of half an hour. This was maintained for one hour, and during the last half hour the bath was gradually decompressed. In some of the cases under observation the respiratory rate was noticed to drop to nine or ten per minute.

Eight patients stated that while in the bath they experienced sensations described as "comfort," "looseness," or "freedom." Two patients considered that they were constantly less short of breath than they had been before treatment

was started. One patient felt no improvement at any time. No definite temporary or lasting increase in the vital capacity was found. On the occasions when the estimations were also made while the patients were in the compressed-air bath, no definite rise in the vital capacity was obtained except in one patient in whom the initial reading on that day was abnormally low. The experience does not support the view that any improvement is due to opening up of alveoli which previously were out of action.

Treatment of Detachment of Retina. H. Arruga.
Arch. Ophthalm. 18:501 (Oct.) 1937.

Diathermy is the most extensively used method at the present time. First designed by Weve, it was rapidly adopted by most operators on account of its freedom from danger. Diathermy may be applied in two ways — to the surface or perforating the surface. To apply surface coagulation one must use an instrument with a flat or a round tip, and the sclera then acquires a slight grayish color. To obtain this result a current of from 30 to 60 ma. is necessary. Perforating diathermy requires a current of greater intensity — from 80 to 150 ma., according to the condition and the size of the electrode. Each method has its definite indications. In general, one uses both methods. When the detachment is flat and the retina is not far from the choroid, surface diathermy followed by a small perforation to drain the subretinal fluid is the best method. In cases of disinsertion near the ora serrata this method is usually satisfactory. In cases of macular holes it is prudent to use surface diathermy in the macular region, very cautiously so as not to injure the retina.

In cases in which there is a large, bulging detachment, surface diathermy may be used associated with perforating diathermy to obtain drainage of the subretinal spaces. This drainage must be as much as the retroretinal cavity

requires. Excessive bulging of the retina is an inconvenience, and an attempt should be made to reduce it before operation by rest in bed and during the operation by compression of the eyeball after puncture of the sclera. In using perforating electrodes one may add a kind of surface diathermy without actually perforating the sclera. This is suitable if it is difficult to obtain dry surface areas, because for surface diathermy to be effective the sclera must not be moist.

Diathermic punctures should not be made too close to one another, as scars will result. It is always best to leave a space of 0.75 mm. between punctures. In surface coagulation the punctures may be made closer together. Verticose veins should also be carefully avoided, experience having shown that their obstruction by coagulation retards healing after operation, notwithstanding the fact that the vessels in the choroid present many anastomoses.

The continuous barrages, when applied transversely, that is, parallel to the equator of the eye, have the inconvenience of coagulating the vessels in an ocular sector and obstructing the circulation for some time; they possibly also interfere with the function of the ciliary nerves. This is probably the reason why in cases in which the coagulation has been extensive there is difficulty in dilating the pupil. It is important that drainage of the subretinal pocket exist long enough, because if the perforations close before the liquid has been absorbed, the retina will not come into contact with the choroid, and adhesion will not take place. To insure satisfactory drainage the openings must be sufficiently large. The fine needles used in diathermy often close too rapidly and are applicable in cases in which the retina is only slightly detached. If there is considerable fluid the perforations should be made with a needle 0.5 mm. in thickness, or, when a fine needle is used, the perforating action should be prolonged and the borders of the hole enlarged.